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Chapter 56
WINDOWS

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Chapter 56
WINDOWS

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Chapter 56

WINDOWS - DESCRIPTION AND OPERATION

1. General

The airplane passenger cabin has Plexiglas windows along the sides of the fuselage. The flight compartment has a three-piece windshield, two sliding side windows and two stationary side windows. The flight compartment windshield and windows are five-ply, laminated windows consisting of three layers of glass and two layers of polyvinyl butyral plastic. Electrical film anti-icing and/or anti-fogging provisions are incorporated in all flight compartment windows. Refer to Chapter 30, ICE AND RAIN PROTECTION, for information on anti-fogging and anti-icing of flight compartment windows. Each cabin window consists of an inner and outer Plexiglas panel. The outer panel consists of two Plexiglas panes bonded together. The inner panel consists of a single Plexiglas pane.

FLIGHT COMPARTMENT WINDOWS - DESCRIPTION AND OPERATION

1. General

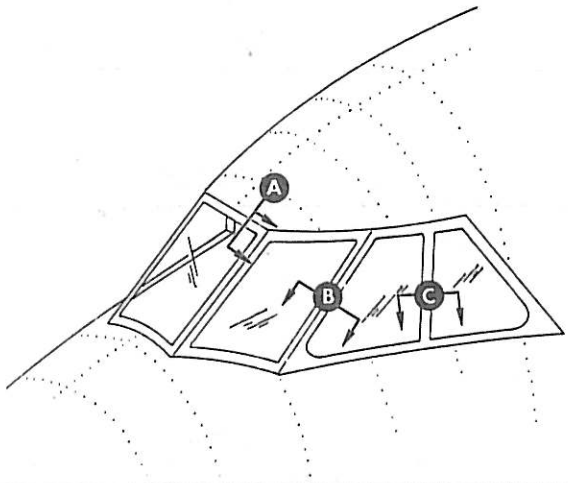
The flight compartment windows, shown on Figure 1, consist of a center windshield, pilot's windshield and copilot's windshield; plus a sliding and a stationary aft window on each side. The pilot's, copilot's, and center windshield panels and the aft side windows are secured to the fuselage structure with screws. The sliding windows are mounted in longitudinal tracks so that the windows can be rolled fore and aft. The sliding windows may also be used as emergency exits.

All flight compartment windows are of laminated construction; they consist of two layers of polyvinyl butyral plastic and three layers of tempered plate glass. A corrosion resistant steel insert is laminated into the periphery of the polyvinyl plastic in each window. This insert tramsmits stress loads from the window attach screws into the polyvinyl plastic.

Internal electrically conductive coatings are applied to the glass areas where anti-icing or anti-fogging effects are desired. The pilot's, copilot's and center windshield panels have two parallel coatings; one high density coating for anti-icing and the other a low density coating for anti-fogging. The sliding and aft side windows have a low density coating for anti-fogging only. Electrical bus bars embedded in the edges of the polyvinyl laminate apply electrical current across the conductive coatings for heat generation. The electrical resistance across each panel is calculated to provide the proper heating for a particular window panel. Heat increases the pliability of the vinyl layers; thus, increasing the impact resistance of the windshields to bird strikes. Temperature sensing elements located in the vinyl layer, next to the conductive coating, control the heat input.

2. Pilot's and Copilot's Windshield Panels

The pilots' windshield panels (see Figure 1) are similar in construction except for being right and left parts. These panels are of laminated construction and have a surface area of approximately 650 square inches each. The outer and middle panes of glass are approximately 0.187-inch and 0.312-inch thick respectively and are made of semi-tempered, polished plate glass. The middle pane is embedded entirely in polyvinyl plastic. The inner pane is full-tempered, polished plate glass approximately 0.312-inch thick. The inboard surface of the outer glass pane is coated for electrical anti-icing; the inboard surface of the middle glass pane is coated for electrical anti-fogging. A silicone rubber insulation seal is bonded around the edge of the outer glass pane. The pilots' windshield panels are installed from outside the fuselage and are secured in place with screws.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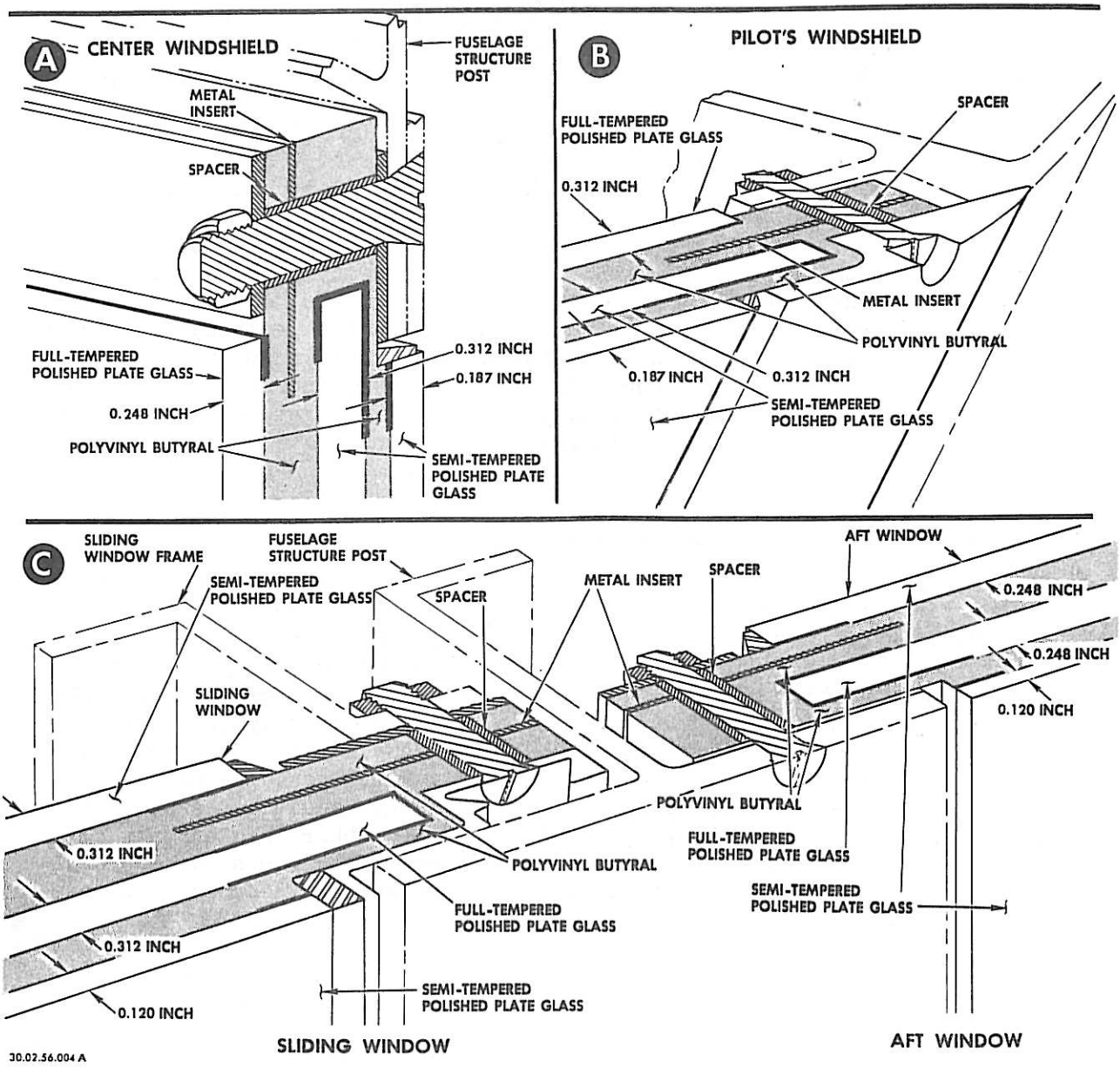
A CENTER WINDSHIELD
FUSELAGE STRUCTURE POST
METAL INSERT
SPACER
FULL-TEMPERED POLISHED PLATE GLASS
0.248 INCH
POLYVINYL BUTYRAL
0.312 INCH
0.187 INCH
SEMI-TEMPERED POLISHED PLATE GLASS
B PILOT'S WINDSHIELD
SPACER
FULL-TEMPERED POLISHED PLATE GLASS
0.312 INCH
METAL INSERT
POLYVINYL BUTYRAL
0.187 INCH
0.312 INCH
SEMI-TEMPERED POLISHED PLATE GLASS
C
SLIDING WINDOW FRAME
FUSELAGE STRUCTURE POST
SEMI-TEMPERED POLISHED PLATE GLASS
SPACER
METAL INSERT
SPACER
AFT WINDOW
0.248 INCH
0.248 INCH
0.120 INCH
SLIDING WINDOW
0.312 INCH
POLYVINYL BUTYRAL
FULL-TEMPERED POLISHED PLATE GLASS
POLYVINYL BUTYRAL
SEMI-TEMPERED POLISHED PLATE GLASS
FULL-TEMPERED POLISHED PLATE GLASS
0.312 INCH
SEMI-TEMPERED POLISHED PLATE GLASS
0.120 INCH
SLIDING WINDOW
AFT WINDOW
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3. Center Windshield Panel

The center windshield (see Figure 1) is of laminated construction and has a surface area of approximately 425 square inches. The inner pane is full tempered and is approximately 0.248-inch thick. The outer and middle panes are semi-tempered, polished plate glass and are approximately 0.187-inch and 0.312-inch thick respectively. The inboard surface of the outer glass pane is coated for electrical anti-icing. The inboard surface of the middle glass pane is coated for electrical anti-fogging.

4. Sliding Windows

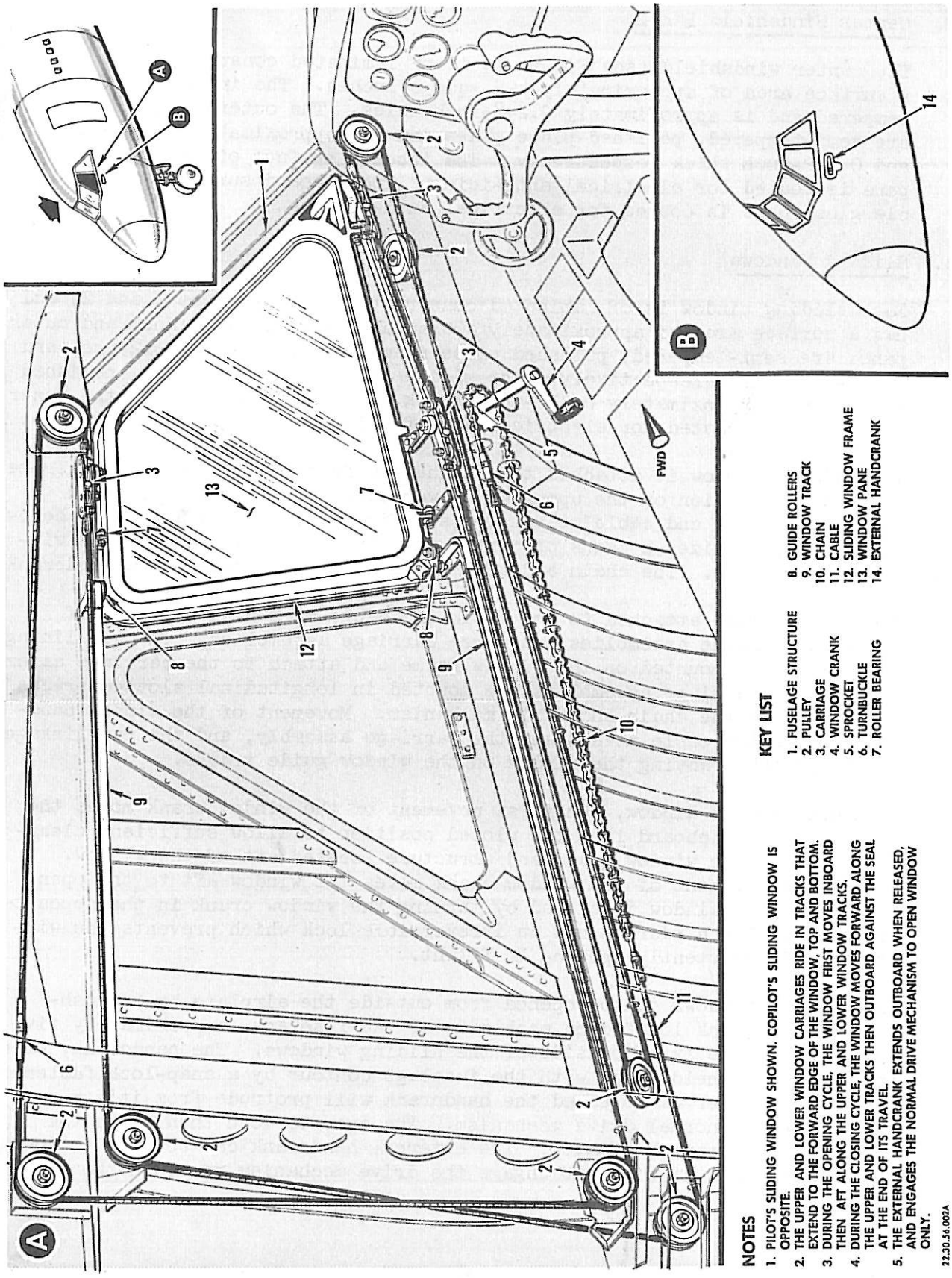
Each sliding window is of laminated construction (see Figures 1 and 2) and has a surface area of approximately 400 square inches. The inner and outer panes are semi-tempered, polished plate glass approximately 0.312-inch and 0.120-inch thick respectively. The middle pane is full-tempered, polished plate glass approximately 0.312-inch thick. The outer surface of the inner glass pane is coated for electrical anti-fogging.

The sliding window is attached to a magnesium frame with screws. The frame is held in position on the upper and lower edges by longitudinal guide tracks. A chain and cable mechanism (see Figure 2), routed above and below the window, provides a means of moving the window fore and aft on the window guide tracks. The chain and cable mechanism is operated by a handcrank.

The window frame attached to the chain and cable mechanism by means of three cam linkage assemblies and three carriage assemblies. The cam linkage assemblies are mounted on the window frame and attach to the carriage assemblies. The carriage assemblies are mounted in longitudinal slotted tracks and fasten to the chain and cable mechanism. Movement of the window handcrank moves the cable mechanism, the carriage assembly, and the cam linkage assembly; thus, moving the window on the window guide tracks.

When opening the window, the first movement of the window crank moves the sliding window inboard from the closed position to allow sufficient clearance between the window frame and structure located aft of the window. Continuing movement of the window crank moves the window aft to the open position. The window is closed by turning the window crank in the opposite direction. The handcrank has an irreversible lock which prevents the window from inadvertently opening in flight.

The sliding windows can be opened from outside the airplane by a flush-mounted handcrank located on each side of the fuselage, approximately five inches below the exterior side of the sliding windows. The handcrank, when not in use, is held flush with the fuselage contour by a snap-lock fastener. When the fastener is released the handcrank will protrude from it's recess and engage the normal drive mechanism. The operator can then grasp the handcrank and open the window. The external handcrank can be used to open the window only; it will not engage the drive mechanism to close the window.



KEY LIST

1. FUSELAGE STRUCTURE
2. PULLEY
3. CARRIAGE
4. WINDOW CRANK
5. SPROCKET
6. TURNBUCKLE
7. ROLLER BEARING
8. GUIDE ROLLERS
9. WINDOW TRACK
10. CHAIN
11. CABLE
12. SLIDING WINDOW FRAME
13. WINDOW PANE
14. EXTERNAL HANDCRANK

NOTES

1. PILOT'S SLIDING WINDOW SHOWN. COPILOT'S SLIDING WINDOW IS OPPOSITE.
2. THE UPPER AND LOWER WINDOW CARRIAGES RIDE IN TRACKS THAT EXTEND TO THE FORWARD EDGE OF THE WINDOW, TOP AND BOTTOM.
3. DURING THE OPENING CYCLE, THE WINDOW FIRST MOVES INBOARD THEN AFT ALONG THE UPPER AND LOWER WINDOW TRACKS.
4. DURING THE CLOSING CYCLE, THE WINDOW MOVES FORWARD ALONG THE UPPER AND LOWER TRACKS THEN OUTBOARD AGAINST THE SEAL AT THE END OF ITS TRAVEL.
5. THE EXTERNAL HANDCRANK EXTENDS OUTBOARD WHEN RELEASED, AND ENGAGES THE NORMAL DRIVE MECHANISM TO OPEN WINDOW ONLY.

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Drainage provisions, for water which enters past the sliding windows when the airplane is unpressurized, consist of a drain hole in each sliding window lower longeron, a flange fitting which is installed on the underside of each longeron to connect a drain hose to the drain hole, a phenolic block at the aft edge of each drain hole to keep water from running aft on the longeron and diverting it to run in the drain holes. The lower inboard corner of the phenolic guide block, at approximate fuselage station 235.00, is chamfered to allow water to run aft along the longeron to the drain hole. The drain hoses empty the water at a point in the bottom of the fuselage just forward of the electronic compartment access door where a drain plug is installed. Accumulated water may be drained by pushing the drain plug up until water drains.

5. Aft Side Windows

The aft side window is of laminated construction (see Figure 1) and has a surface area of approximately 139 square inches. The aft side window attaches directly to the fuselage structure and does not open. The inner and outer window panes are semi-tempered, polished plate glass approximately 0.248-inch and 0.120-inch thick respectively. The middle pane is full-tempered, polished plate glass approximately 0.248-inch thick. The outer surface of the inner glass pane is coated for electrical anti-fogging.

FLIGHT COMPARTMENT WINDOWS - TROUBLE SHOOTING

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
1. LEAK AROUND FLIGHT COMPARTMENT WINDOW SEAL	
A. Defective seal.	Pressurize the fuselage in accordance with Chapter 21, AIR CONDITIONING then apply bubble fluid. Specification MIL-S-4282, or castile soap solution to the exterior periphery of the window frames or suspected area of leakage. Bubbles will appear where leaks exist. Remove bubble fluid or soap with clear water. Repair leaks with sealants as described in Chapter 51, STRUCTURES GENERAL.
2. ANTI-ICING, ANTI-FOGGING SYSTEMS DO NOT OPERATE PROPERLY	
A. Faulty system.	Refer to Chapter 30, ICE AND RAIN PROTECTION, for trouble shooting procedures.

FLIGHT COMPARTMENT WINDOWS - MAINTENANCE PRACTICES

1. Inspection/Check Flight Compartment Windows

   A. Examine flight compartment window panels for the following:

      (1) Examine windows for cracks, scratches, delamination, flaking, and chipping.

      (2) Check window retainers, frames, and support structure for cracks and corrosion.

      (3) Check each sliding window chain, crank, roller, and pulley for damage and excessive wear.

      (4) Check sliding window guide tracks for cracks, corrosion, and foreign matter.

      (5) Check opening and closing operation of sliding window.

      (6) Check electrical terminal connections for corrosion.

2. Flight Compartment Windows Allowable Damage

   The flight compartment windows consist of three windshield panels, two sliding side windows, and two aft stationary side windows. The following allowables apply to any window or windshield in the flight compartment.

   A. Scratches.

      When vision is impaired by scratches, the panel must be replaced.

   B. Cracks.

      When vision is impaired by a crack; or there is more than a single crack in one ply; or when more than one ply is cracked, the panel must be replaced.

   C. Flakes and Chips.

      When vision is impaired by flakes or chips, the panel must be replaced.

   D. Bubbling.

      When vision is impaired by bubbles, the panel should be replaced.

   E. Delamination.

      When vision is impaired by delamination or when delamination exceeds the limits shown on Figure 201, the panel should be replaced.

3. Cleaning Flight Compartment Windows

A. Equipment Required.

(1) Nu-wipe paper tissue toweling.

(2) Castile soap; as required.

(3) Shell Solvent TS-1; as required.

CAUTION: DO NOT USE SOLVENTS WHICH CONTAIN AROMATIC HYDROCARBONS FOR CLEANING PLEXIGLAS WINDOWS. ACRYLIC PLASTIC ABSORBS SOLVENT FUMES. THESE FUMES COULD DESTROY THE WINDOW STRUCTURAL STRENGTH AND OPTICAL QUALITY.

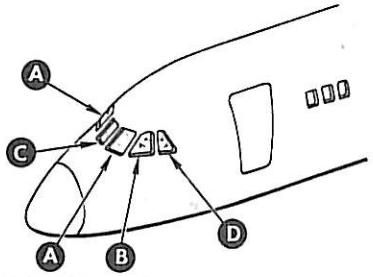
B. Clean Window.

(1) Flush window with clean water. Using hands, gently dislodge dirt or mud particles.

CAUTION: REMOVE RINGS OR OTHER HARD OBJECTS FROM HANDS BEFORE WASHING WINDOWS.

(2) Films not removed by water may be removed by washing windows with Castile soap (10% solution) or Shell Solvent TS-1, followed by washing thoroughly with clean water.

(3) Dry with Nu-wipe tissue toweling.



NOTE:

1. SHADED AREA REPRESENTS EXTENT OF ALLOWABLE DELAMINATION, AS MEASURED FROM EDGE OF OUTBOARD PLY.
2. ALL VIEWS SHOWN ARE LOOKING AT OUTBOARD SURFACE OF PANELS.
3. 2.00 INCH MAXIMUM MAY BE EXCEEDED IN AN AREA 3.00 INCHES FROM EDGE OF OUTBOARD PLY PROVIDED ADDITIONAL DELAMINATED AREA DOES NOT EXCEED 1.00 SQ. INCH WITH ONE SUCH AREA PERMITTED ON EACH EDGE OF PANEL.

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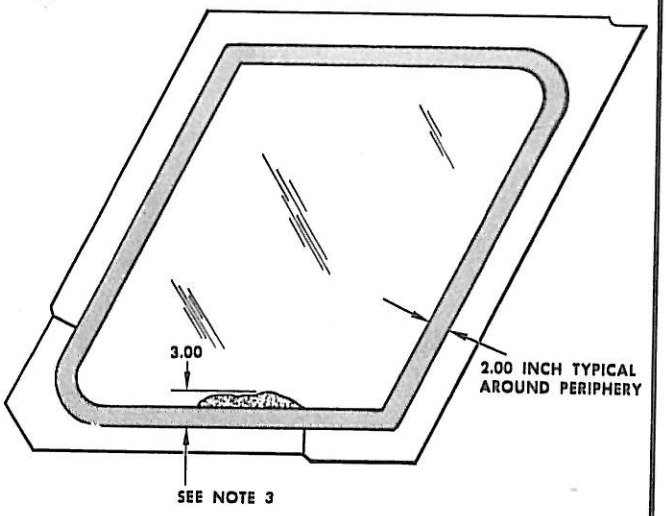
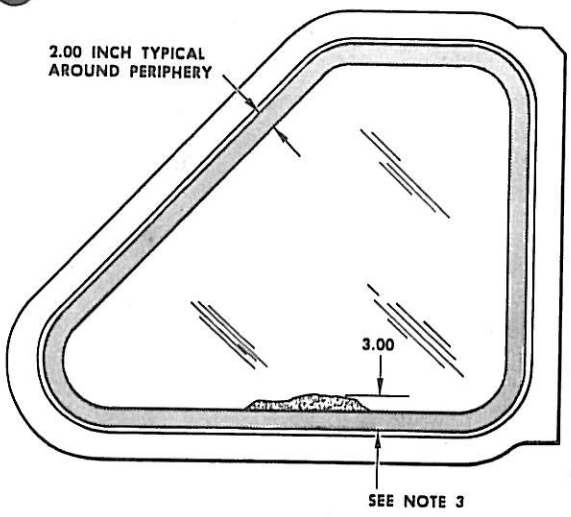


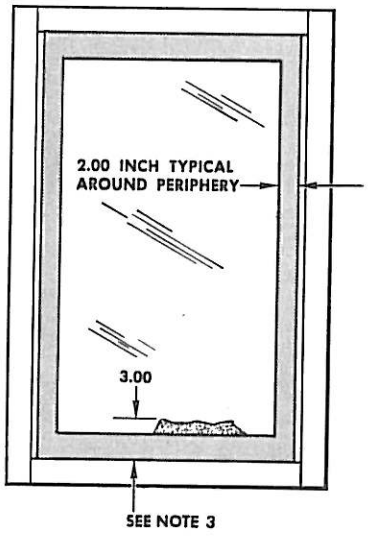
PILOT'S AND COPILOT'S WINDSHIELD

B



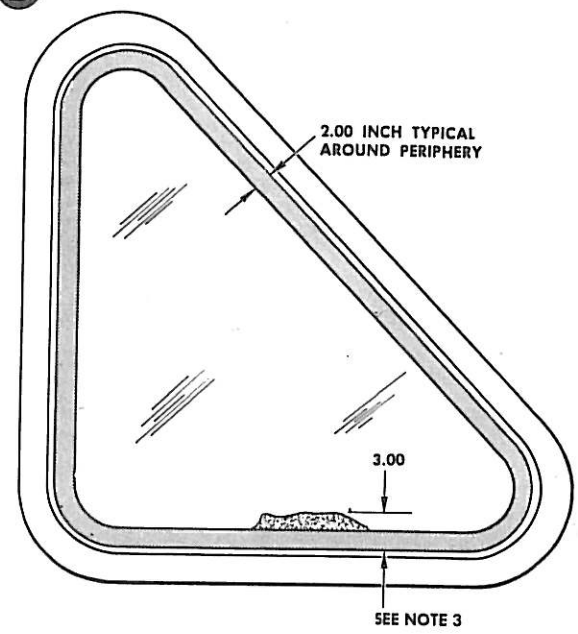
SLIDING WINDOW

C



CENTER WINDSHIELD

D



AFT SIDE WINDOW

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PILOT'S AND COPILOT'S WINDSHIELD - MAINTENANCE PRACTICES

1. Removal/Installation Pilot's and Copilot's Windshield Panels (see Figure 201)

NOTE: Removal/Installation procedures for the pilot's and copilot's windshield panels are identical.

A. Equipment Required.

(1) EC1667 Sealant with EC1662 Primer (or General Electric RTV-90 Sealer with 81822 Primer) as required. 3M Co., St. Paul, Minn.

(2) EC833 Sealant (or equivalent) as required. 3M Co., St. Paul, Minn.

B. Preparation.

(1) Open PILOT'S and COPILOT'S WDSHLD ANTI-ICE & DEFOG circuit breakers at the main circuit breaker panel. Tag and safety the circuit breakers in the open position.

(2) Remove the following limiters from ac power distribution box:

PILOT'S WINDSHIELD ANTI-ICE
PILOT'S WINDSHIELD ANTI-FOG

COPILOT'S WINDSHIELD ANTI-ICE
COPILOT'S WINDSHIELD ANTI-FOG

WARNING: DO NOT OPEN THE AC POWER DISTRIBUTION BOX WHEN BATTERY POWER IS ON, WHEN THE ENGINES ARE RUNNING, OR WHEN EXTERNAL POWER IS CONNECTED TO THE AIRPLANE.

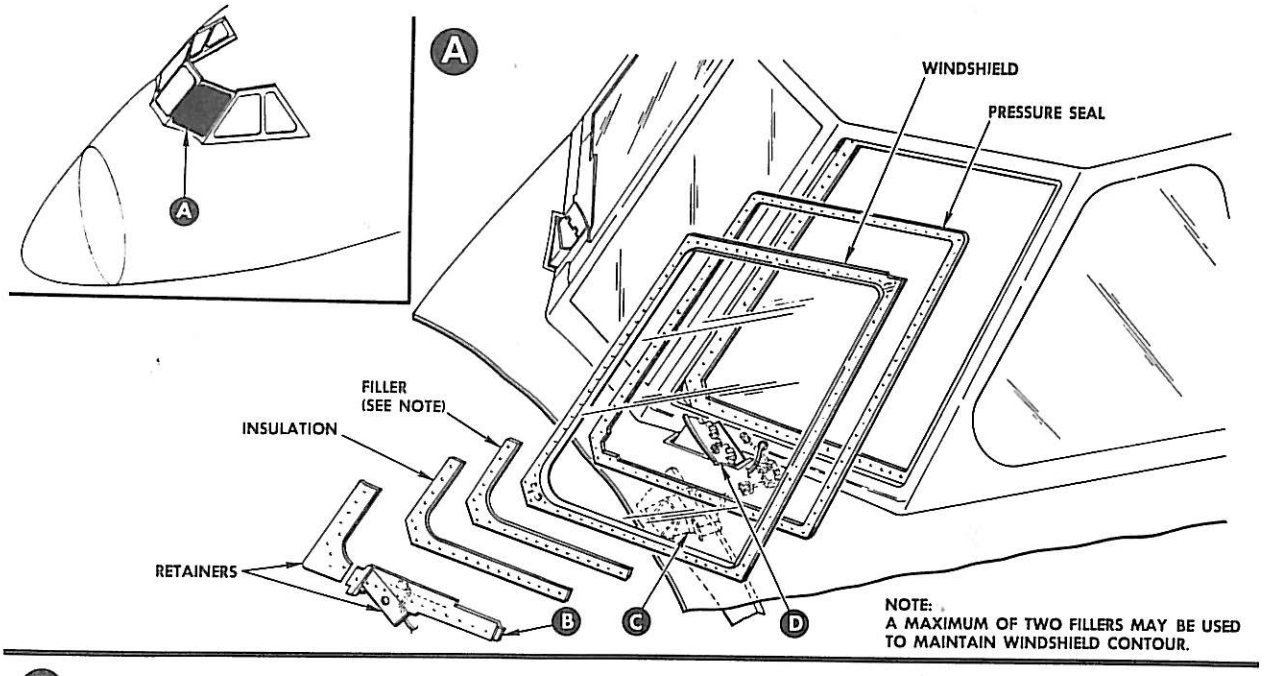
(3) Open the WINDSHIELD RAIN CLEAR circuit breaker at the main circuit breaker panel. Tag and safety the circuit breaker in the open position.

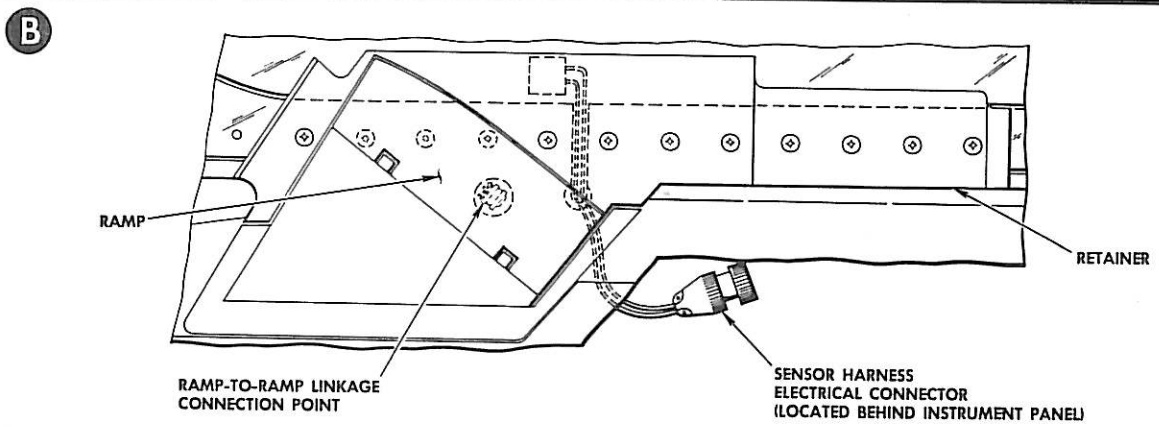
C. Remove Windshield.

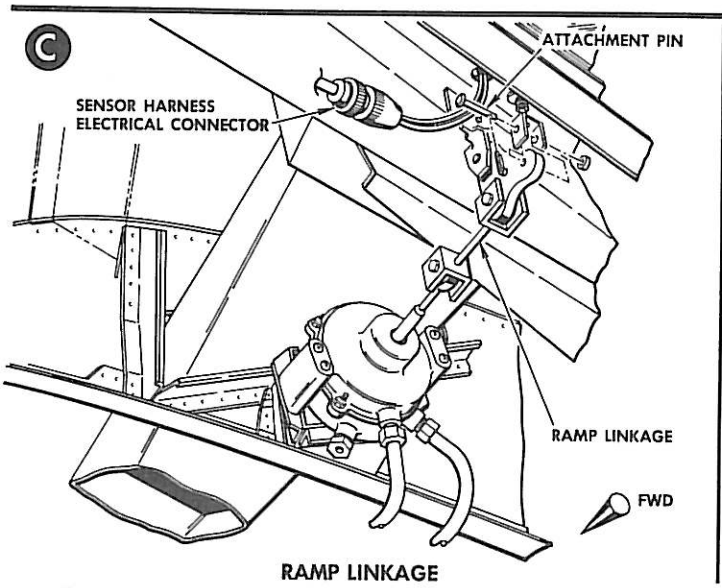
NOTE: Bag and tag loose hardware to facilitate installation.

(1) Disconnect ramp linkage located behind the pilot's instrument panel by removing the attaching cotter pin, washer, and attachment pin. (Bag and tag hardware for installation.)

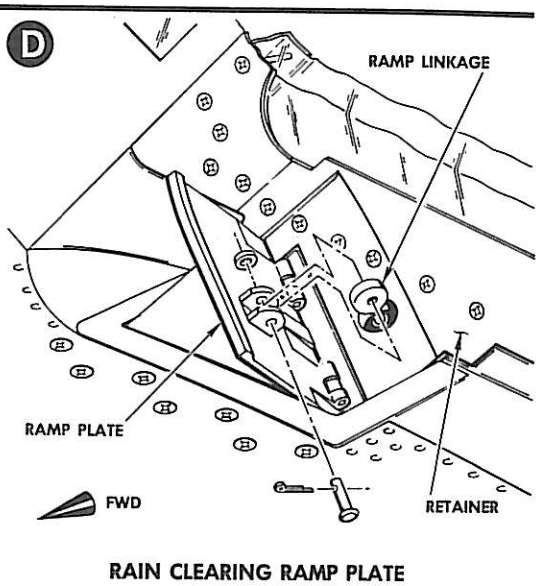
NOTE: To gain access to the windshield rain clearing ramp linkage, located behind the pilots' instrument panel, slide the instrument panel aft on the panel sliding support rods. Refer to Chapter 31, INSTRUMENTS, for instructions.







RAMP LINKAGE



RAIN CLEARING RAMP PLATE

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(2) Working from behind the instrument panel, disconnect the rain clearing sensor electrical harness connector.

NOTE: The rain clearing sensor is located beneath the windshield retainers at the lower forward corner of the windshield. The rain clearing harness consists of two wires leading to the sensor.

(3) Working from the exterior side of the windshield, raise the windshield rain clearing ramp plate. Disconnect ramp linkage from the ramp plate by removing the attaching cotter pin and attachment pin.

(4) Remove attaching screws from the two retainers located at the lower forward corner of the windshield. Carefully remove the retainers to the slack limits of the attached rain clearing heat sensor wires.

(5) Remove filler and insulation from lower forward corner of the windshield.

(6) Disconnect electrical terminals from the windshield. (Tape and tag electrical wiring for installation.)

(7) Remove the remaining screws from the periphery of the windshield and remove the windshield.

(8) Remove pressure seal from periphery of the windshield opening.

D. Install Windshield.

(1) Using a nonmetallic scraper, remove the old sealant from the periphery of the windshield opening.

(2) Position pressure seal around periphery of windshield frame. Align screw holes in pressure seal with screw holes in windshield frame.

NOTE: If not damaged, adhesive-backed pressure seal may be reused during windshield replacement. Before installing the reusable pressure seal, apply EC833 sealant (or equivalent) to the faying surface of the seal.

(3) Position windshield over opening. Position insulation and filler at lower forward corner of windshield frame. Align screw holes of insulation and filler with screw holes on windshield frame.

NOTE: A maximum of two fillers are allowable to shim windshield contour.

(4) Connect electrical terminals to windshield.

(5) Working from exterior side of the windshield, raise the windshield rain clearing ramp plate. Connect the ramp linkage to the ramp plate using an attachment pin and cotter pin.

(6) Position the two retainers on the lower forward corner of the windshield. Using screws, install the retainers and the windshield.

NOTE: Apply EC1667 sealant to threaded portion of screws prior to installation. Torque screws 12-15 inch-pounds.

(7) Using EC1667 Sealant fill screw holes, on outboard edge of windshield frame, flush with outboard surface of windshield frame.

(8) Using EC1667 Sealant (preceded with EC1662 Primer), fill gap between windshield frame and adjacent structure. Apply sealant flush with outside surface of windshield frame and adjacent structure.

CAUTION: DO NOT APPLY SEALANT BETWEEN LIP OF RETAINER (MOUNTED ON LOWER FORWARD CORNER OF WINDSHIELD) AND WINDSHIELD GLASS.

(9) Working behind the instrument panel, connect the rain clearing sensor harness electrical connector.

NOTE: Refer to Chapter 31, INSTRUMENTS, for directions on gaining access behind the instrument panel. The rain clearing sensor is located beneath the windshield retainers at the lower forward corner of the windshield. The rain clearing harness consists of two wires leading to the sensor.

(10) Connect ramp linkage located behind the pilots' instrument panel using attachment pin, washer, and cotter pin.

(11) Perform a functional test of the windshield rain clearing heating systems in accordance with Chapter 30, ICE AND RAIN PROTECTION.

(12) Clean windshield in accordance with 56-1-0.

CENTER WINDSHIELD - MAINTENANCE PRACTICES

1. Removal/Installation Center Windshield (see Figure 201)

A. Equipment Required.

(1) Stand suitable to reach windshield.

(2) EC1667 Sealant with EC1662 Primer (or General Electric RTV-90 Sealer with 81822 Primer) as required. 3M Co., St. Paul, Minn.

(3) EC833 Sealant (or equivalent as listed in Specification MIL-T-10168A) as required. 3M Co., St. Paul, Minn.

B. Preparation.

(1) Open the CENTER-WDSHLD ANTI-ICE & DEFOG circuit breaker at the main circuit breaker panel. Tag and safety the circuit breaker in the open position.

(2) Remove the following limiters (two each) from ac power distribution box:

CENTER-WINDSHIELD ANTI-ICE

CENTER-WINDSHIELD ANTI-FOG

WARNING: DO NOT OPEN THE AC POWER DISTRIBUTION BOX WHEN THE BATTERY POWER IS ON, WHEN ENGINES ARE RUNNING, OR WHEN EXTERNAL POWER IS CONNECTED TO THE AIRPLANE.

C. Remove Windshield.

NOTE: Bag and tag loose hardware to facilitate installation.

(1) Disconnect anti-ice and anti-fog electrical terminals from the windshield. (Tape and tag wiring for installation.)

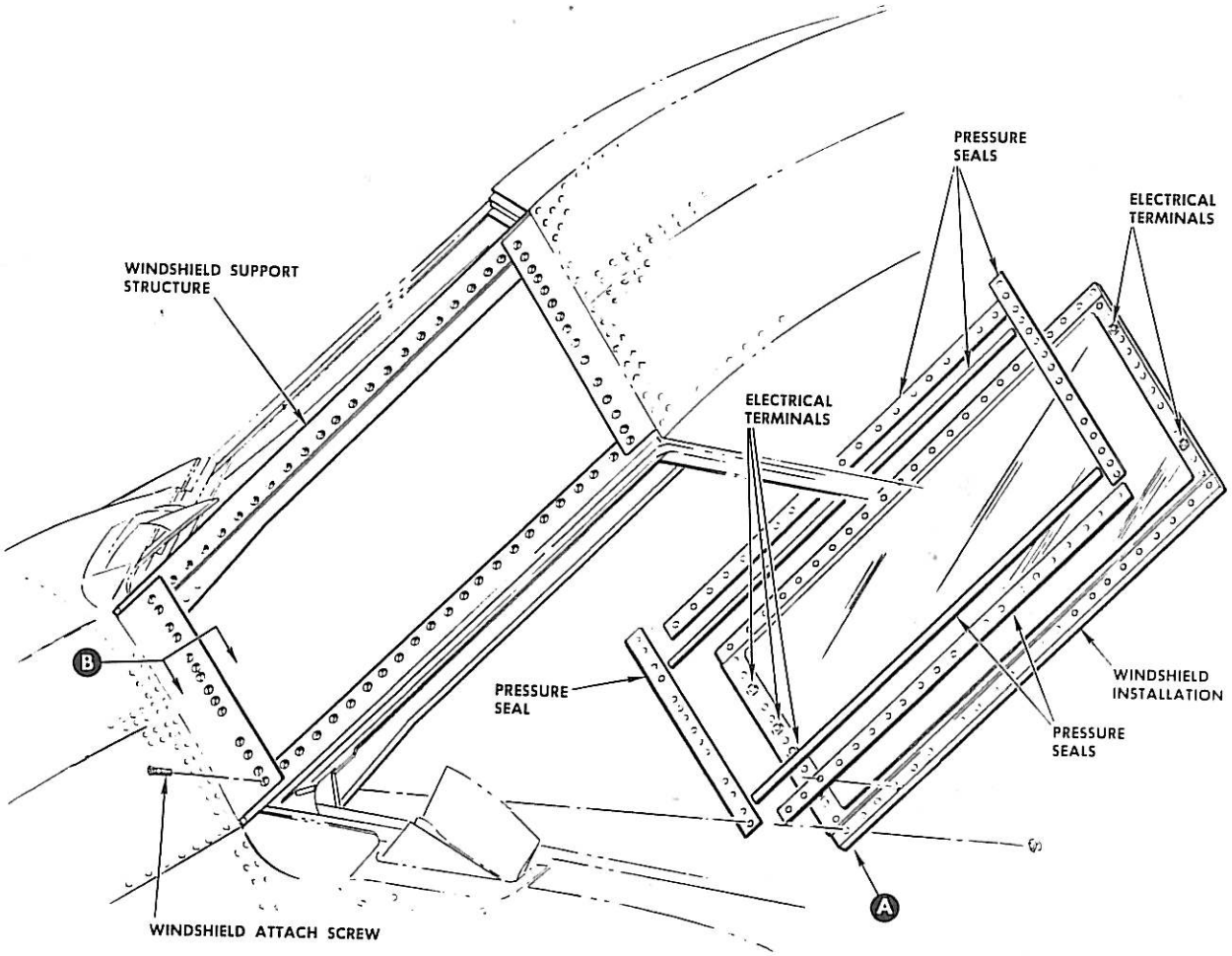
(2) Remove attaching screws and nuts from periphery of the windshield. Remove windshield.

CAUTION: DO NOT USE TOOL TO PRY OUT WINDSHIELD AS WINDSHIELD SUPPORT STRUCTURE OR PRESSURE SEALS MAY BE DAMAGED. IF OLD SEALANT CAUSES DIFFICULTY IN REMOVAL OF WINDSHIELD, BUMP WINDSHIELD INWARD WITH HEEL OF HAND TO BREAK SEALANT ADHESION.

(3) Remove pressure seals from periphery of windshield opening.

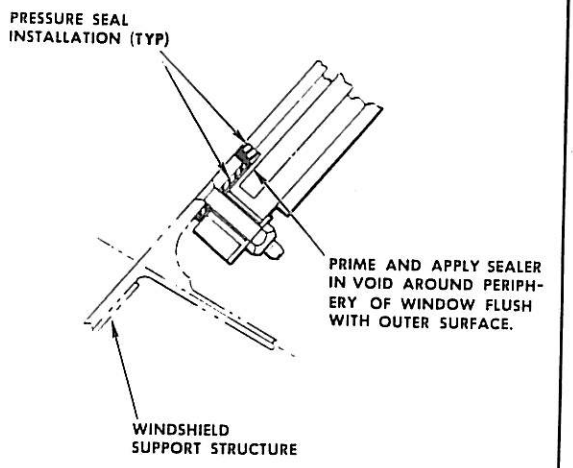
D. Install Windshield.

(1) Remove the old Sealant from periphery of windshield opening, using a nonmetallic scraper.

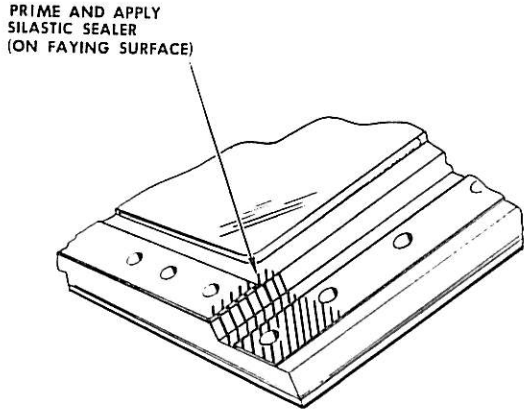


CENTER WINDSHIELD INSTALLATION

B


PRESSURE SEAL INSTALLATION (TYP)
PRIME AND APPLY SEALER IN VOID AROUND PERIPHERY OF WINDOW FLUSH WITH OUTER SURFACE.
WINDSHIELD SUPPORT STRUCTURE

A



TYPICAL FOUR CORNERS OF WINDSHIELD

SEALER APPLICATION

22.02.56.006 A

(2) Install the six pressure seals around periphery of center windshield panel. Install one, with no screw holes, immediately adjacent to each vertical edge of windshield glass panel. Install the other four, with screw holes, by aligning screw holes in seal with corresponding screw holes in windshield panel. Adhesive back on seals will hold seals in place until screws are installed for windshield installation.

NOTE: If not damaged, adhesive-backed pressure seals may be reused. If seals that are reused will not stick to windshield for installation of screws, apply EC833 Silastic Sealant to faying surface of panel, to which seals are to be stuck for installation and install seals as per step (2) above.

(3) Apply EC1662 Primer on faying surface and in void at each of the four corners of windshield.

(4) Apply EC1667 Silastic Sealant on faying surface and in void at each of four corners of windshield.

(5) Position windshield for installation and connect anti-ice and anti-fog electrical terminals.

(6) Using screws and nuts, install windshield.

NOTE: Apply EC1667 Silastic Sealant to threaded portion of screws prior to installation. Install 5/16-inch screws across bottom and top of center windshield installation. Install 1/4-inch screws on sides. Torque 5/16-inch screws to 70 to 75-inch pounds and 1/4-inch screws to 30 to 40-inch pounds.

(7) Apply EC1662 Primer in gap around periphery of windshield, and to tops of screws and exposed screw holes above screw heads.

(8) Using EC1667 Silastic Sealant fill gap between center windshield frame and adjacent structure and in screw holes on top of screw heads. Apply sealant flush with outside surface of windshield frame and adjacent structure.

(9) Using EC1667 Silastic Sealant, fill gaps and screw holes on corners of center windshield frame.

(10) Perform functional test of the windshield heating systems in accordance with Chapter 30, ICE AND RAIN PROTECTION.

(11) Clean windshield in accordance with 56-1-0.

SLIDING WINDOW - TROUBLE SHOOTING

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
1. SLIDING WINDOW WILL NOT CLOSE	
A. Foreign matter lodged in window guide track.	Clear window guide track.
B. Slotted guide track attach rivet catching on window carriage.	Remove and replace rivet.
C. Window seal out of retainer and catching on window frame.	If seal is not damaged, install seal in retainer. If seal is damaged, replace seal.
D. Sliding window cam linkage out of adjustment.	Loosen sliding window cam linkage attach bolts and shorten cam linkage (approximately one or two serrations) until ease of closing is acquired.
E. Sliding window adjustment plate out of alignment.	Loosen adjustment plate attach bolts and reposition plate outboard approximately one or two serrations.
F. Cable turnbuckle catching on cable access holes.	Remove cockpit trim, covering hand crank portion of cable mechanism, and check that cable turnbuckle is not caught on cable access hole. If cable is catching on access hole, tighten cable tension.
2. SLIDING WINDOW WILL NOT OPEN	
A. Foreign matter lodged in window guide track.	Clear window guide track of foreign matter.
B. Guide track attaching rivet catching on window carriage.	Remove and replace rivet.
3. SLIDING WINDOW DIFFICULT TO OPERATE	
A. Inner handle cam rollers out of round.	Remove and replace worn cam rollers.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
4. PRESSURE LEAK AROUND SLIDING WINDOW	
A. Window seal damaged or out of seal retainer.	If not damaged, reinstall sliding window seal in seal retainer. If damaged, replace seal.
B. Sliding window out of adjustment.	Adjust window.

SLIDING WINDOWS - MAINTENANCE PRACTICES

1. Removal/Installation Sliding Window Assembly (see Figure 201)

NOTE: Removal/Installation procedures for left and right sliding window assemblies are identical. Removal of sliding window assembly does not affect the chain and cable mechanism setting.

A. Equipment Required.

(1) EC1667 Sealant with EC1662 Primer (or General Electric RTV-90 Sealer with 81822 Primer) 3M Co., St. Paul, Minn.

(2) TEMP-R-TAPE TH-18 (or equivalent) Connecticut Hard Rubber Co., New Haven, Conn.

B. Preparation.

(1) Open and tag the SLIDE-PILOT & COPILOT WINDOWS DEFOG circuit breaker, located at the main circuit breaker panel.

(2) Remove the following limiters (two places) from ac power distribution box:

SLIDE-WINDOW ANTI-FOG

WARNING: DO NOT OPEN THE AC POWER DISTRIBUTION BOX WHEN THE BATTERY POWER IS ON, WHEN THE ENGINES ARE RUNNING, OR WHEN EXTERNAL POWER IS CONNECTED TO THE AIRPLANE.

C. Remove Sliding Window.

NOTE: Bag and tag loose hardware to facilitate installation.

(1) Move window assembly to extreme forward position.

(2) Remove bolts, washers, and safety wire from cam linkage assemblies located on lower surface of the window assembly.

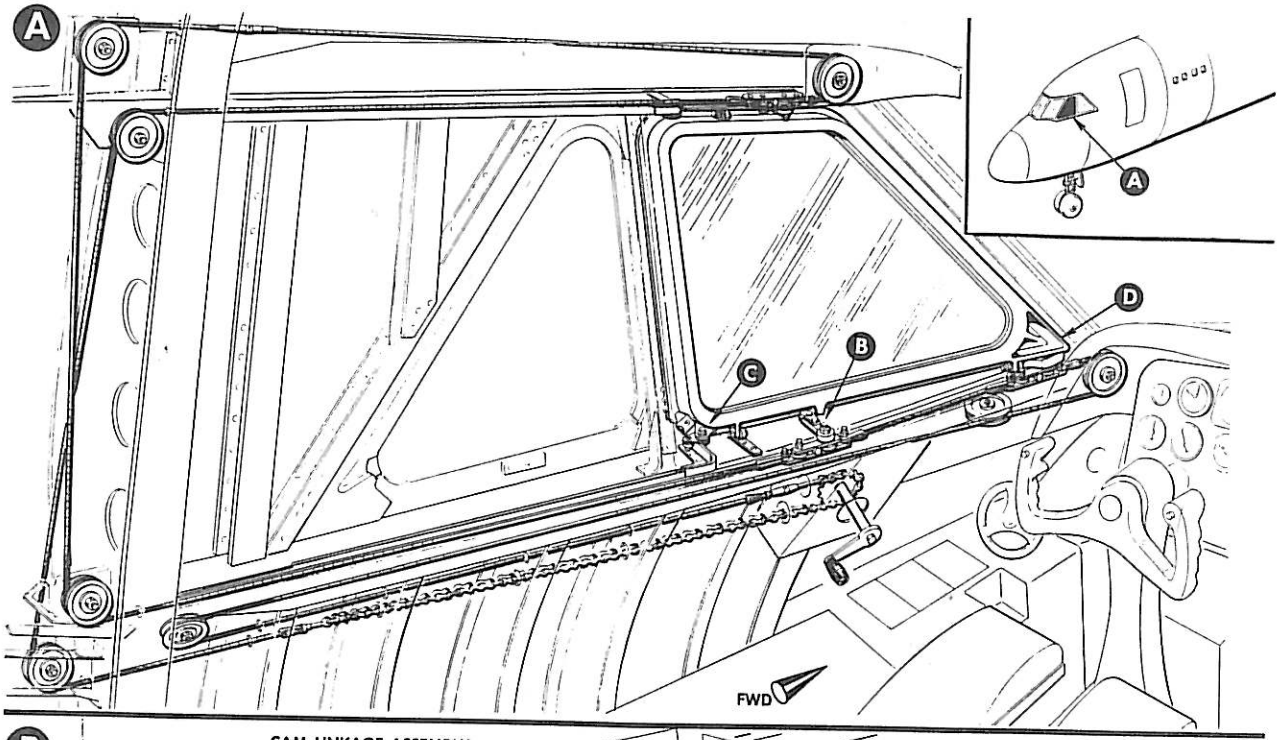
(3) Remove bolts, washers, and safety wire from cam linkage assembly located on upper surface of the window assembly.

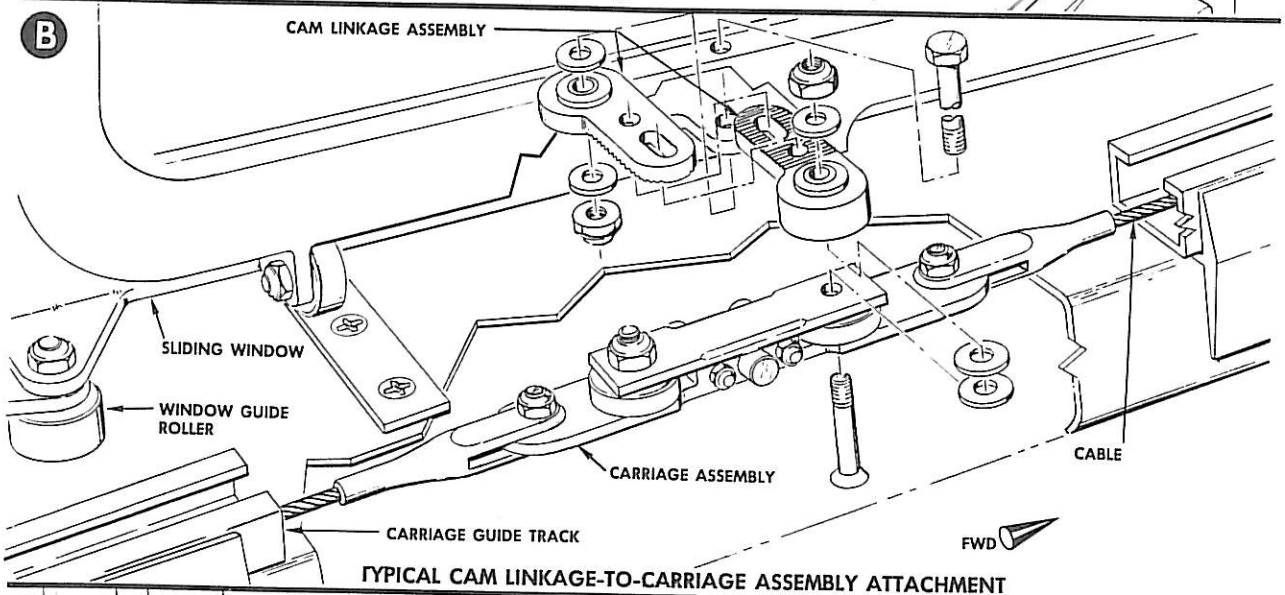
(4) Remove bolt attaching window assembly to guide roller on aft lower corner of window assembly.

(5) Move window assembly aft to approximate midposition of window tracks.

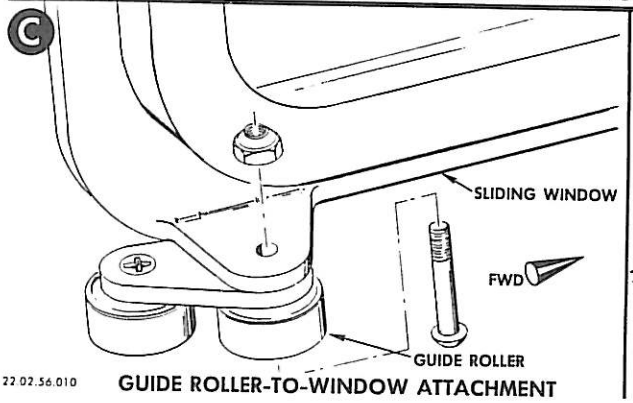
(6) Remove bolts securing window adjustment plate to window carriage at lower forward corner of window.

(7) Move lower edge of window assembly inboard. Lower window to clear upper window track structure; remove window assembly.



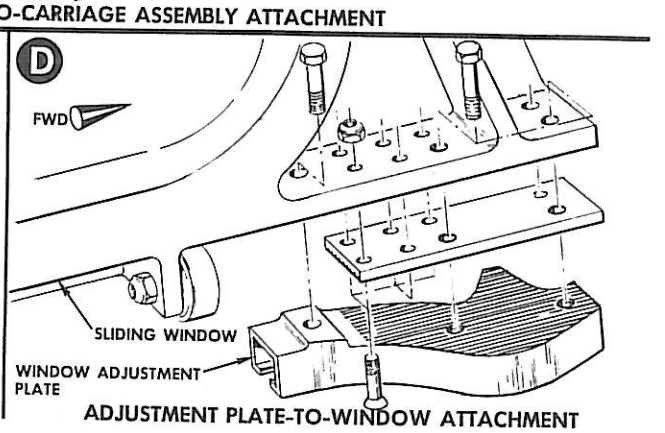


TYPICAL CAM LINKAGE-TO-CARRIAGE ASSEMBLY ATTACHMENT



22.02.56.010

GUIDE ROLLER-TO-WINDOW ATTACHMENT



ADJUSTMENT PLATE-TO-WINDOW ATTACHMENT

NOTE: Removal of window glass from the sliding window frame may be accomplished as follows:

(8) Disconnect electrical terminals from window. (Tape and tag electrical wiring for installation.)

(9) Remove pressure seal from seal retainer located around outboard periphery of sliding window frame.

(10) Remove screws and nuts attaching window glass to window frame; remove window glass.

CAUTION: PROVIDE SUPPORT FOR WINDOW GLASS PRIOR TO REMOVING THE ATTACHING SCREWS AND NUTS.

D. Install Sliding Window.

NOTE: Installation of the window glass to the sliding window frame may be accomplished as directed in steps (1) through (5). If window glass has not been removed from frame, omit steps (1) through (3) and proceed with step (4).

(1) Apply EC1662 Primer on faying surface around periphery at window.

(2) After primer has dried five minutes, apply EC1667 Sealant to primed area.

(3) Position window glass on window frame. Attach the window glass to the frame with screws and nuts. Torque 3/16-inch diameter screws to 12-15-inch pounds.

(4) Install pressure seal in seal retainer located around the outboard periphery of the window frame.

(5) Inspect and (if necessary) replace chafing strip around periphery of window. If necessary to replace chafing strip, install 1/4-inch TH-18 TEMP-R-TAPE in one continuous strip with one carefully spliced butt splice. Location of splice is optional.

(6) Connect electrical terminals to the window.

(7) Using window crank, move upper and lower window carriage assemblies to extreme aft position.

(8) Position upper edge of window assembly on extreme forward end of upper window track.

(9) Move lower edge of sliding window assembly outboard onto lower window track.

(10) Support window assembly and crank upper and lower carriage assemblies forward until cam linkage, attached to window, aligns with the cam linkage attached to the carriage assemblies.

(11) Using bolts, washers, and safety wire secure cam linkage, attached to upper and lower surfaces of window assembly, with cam linkage attached to upper and lower window carriage assemblies.

(12) Move window assembly aft to approximate midposition of window tracks.

(13) Using bolts, secure window adjustment plate (located at forward lower corner of window assembly) to window carriage assembly.

(14) Move window assembly to extreme forward position. Adjust upper and lower cam linkage.

NOTE: The sliding window cam linkage is serrated and may be adjusted by lengthening or shortening the linkage as desired.

(15) Adjust window adjustment plate located on lower forward corner of window assembly.

NOTE: The sliding window adjustment plate, located on lower forward corner of the window assembly, is serrated and may be adjusted to acquire proper window fair-in with fuselage contour.

(16) With window assembly in extreme forward position, bolt guide roller to aft lower corner of window assembly.

(17) Perform Adjustment/Test Sliding Windows.

(18) Perform a functional check of the window heating system in accordance with Chapter 30, ICE AND RAIN PROTECTION.

(19) Clean window in accordance with 56-1-0.

2. Removal/Installation Flight Compartment Sliding Window External and Interior Handles (see Figure 202)

The external handcrank can be used to open the window only; it will not engage the cable drive mechanism to close the window.

A. Equipment Required - None.

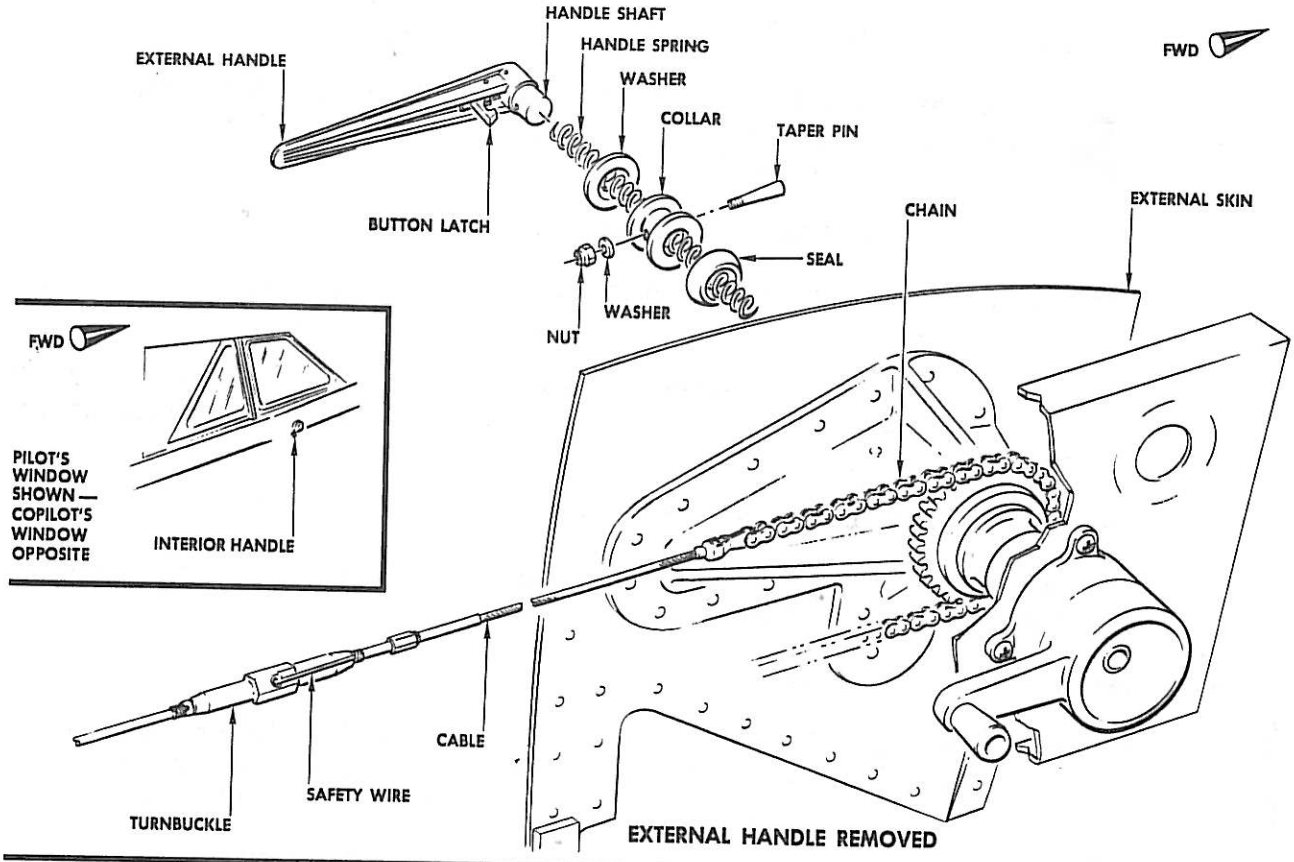
B. Remove External Handle.

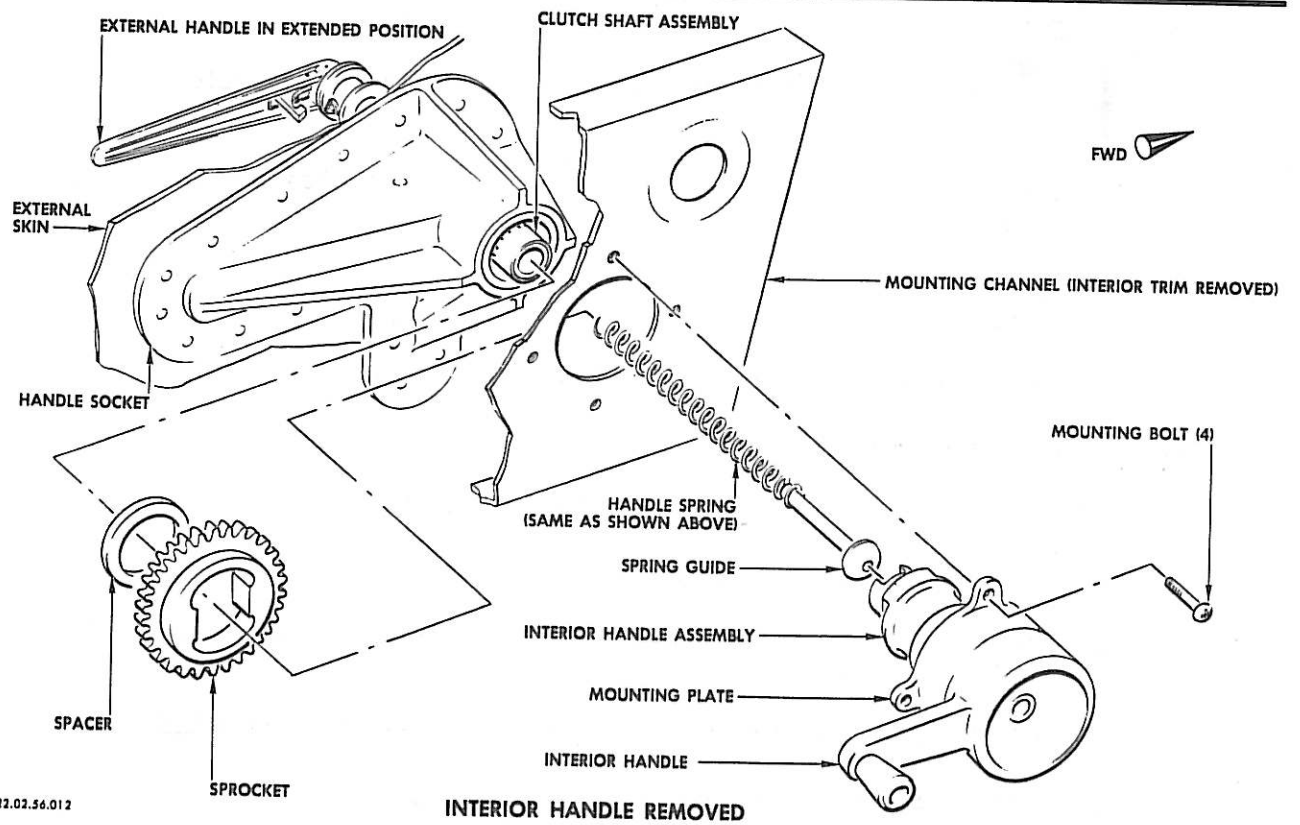
NOTE: Bag and tag all loose parts for ease of reinstallation.

(1) With the sliding window closed and locked, place external handle in extended position to relieve tension on the handle spring, as shown in Figure 202.

(2) Remove taper pin from external handle shaft.

(3) Remove handle shaft, washer, collar, seal, spring, spring guide, and clutch shaft assembly.





Flight Compartment Sliding Window
External and Interior Handles
Figure 202

C. Install External Handle.

NOTE: Observe condition of dry film lubricant on clutch and clutch shaft assembly; touch up if required, or refinish as directed in Chapter 12, SERVICING.

(1) Place clutch assembly in handle housing.

(2) Install clutch shaft assembly, spring guide, spring, seal, collar, washer, and handle shaft, as shown in Figure 202.

(3) Install taper pin in external handle shaft. Small end of taper pin shall be flush to 0.060 above the work surface of the collar after tightening.

(4) Place external handle in the closed and locked position.

(5) Check external handle mismatch; handle shall be flush with fuselage contour ±0.063 inches.

D. Remove Interior Handle.

NOTE: If removal of entire interior handle assembly is not required, disregard the following steps. Interior handle crank may be separated from the handle assembly as shown on Figure 203.

(1) Remove interior trim as directed in Chapter 25, EQUIPMENT/FURNISHINGS.

(2) Place external handle in the extended position to relieve tension on spring.

(3) Remove safety wire from turnbuckle at end of chain; remove chain from sprocket.

(4) Remove (4) bolts attaching handle assembly to channel, as shown in Figure 202.

(5) Remove handle assembly, sprocket, and spacer.

E. Install Interior Handle.

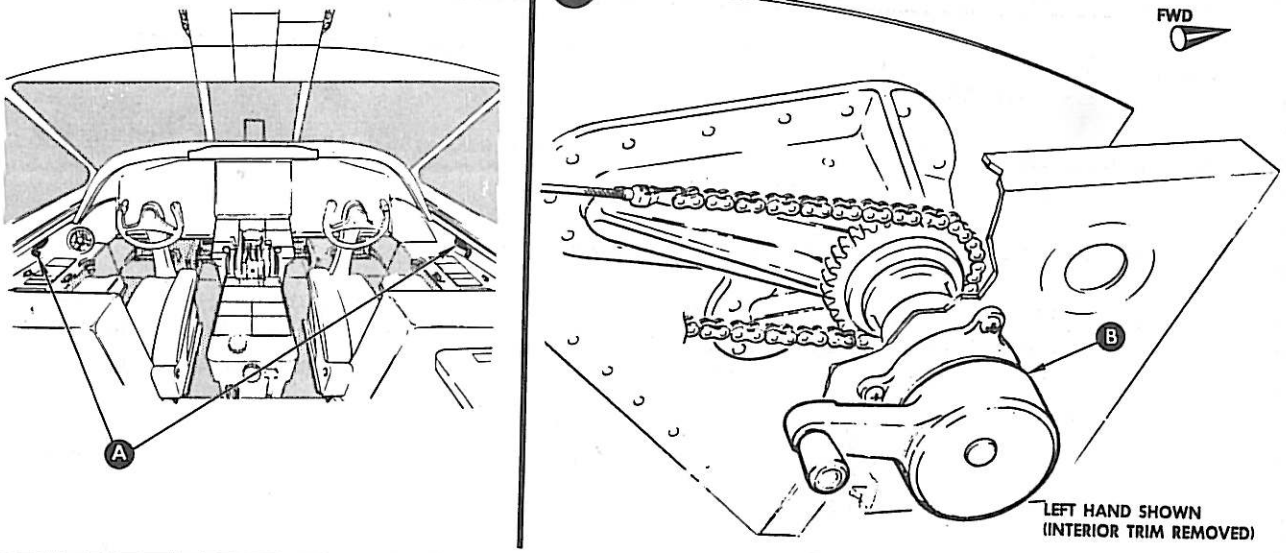
(1) Place handle assembly in mounting channel.

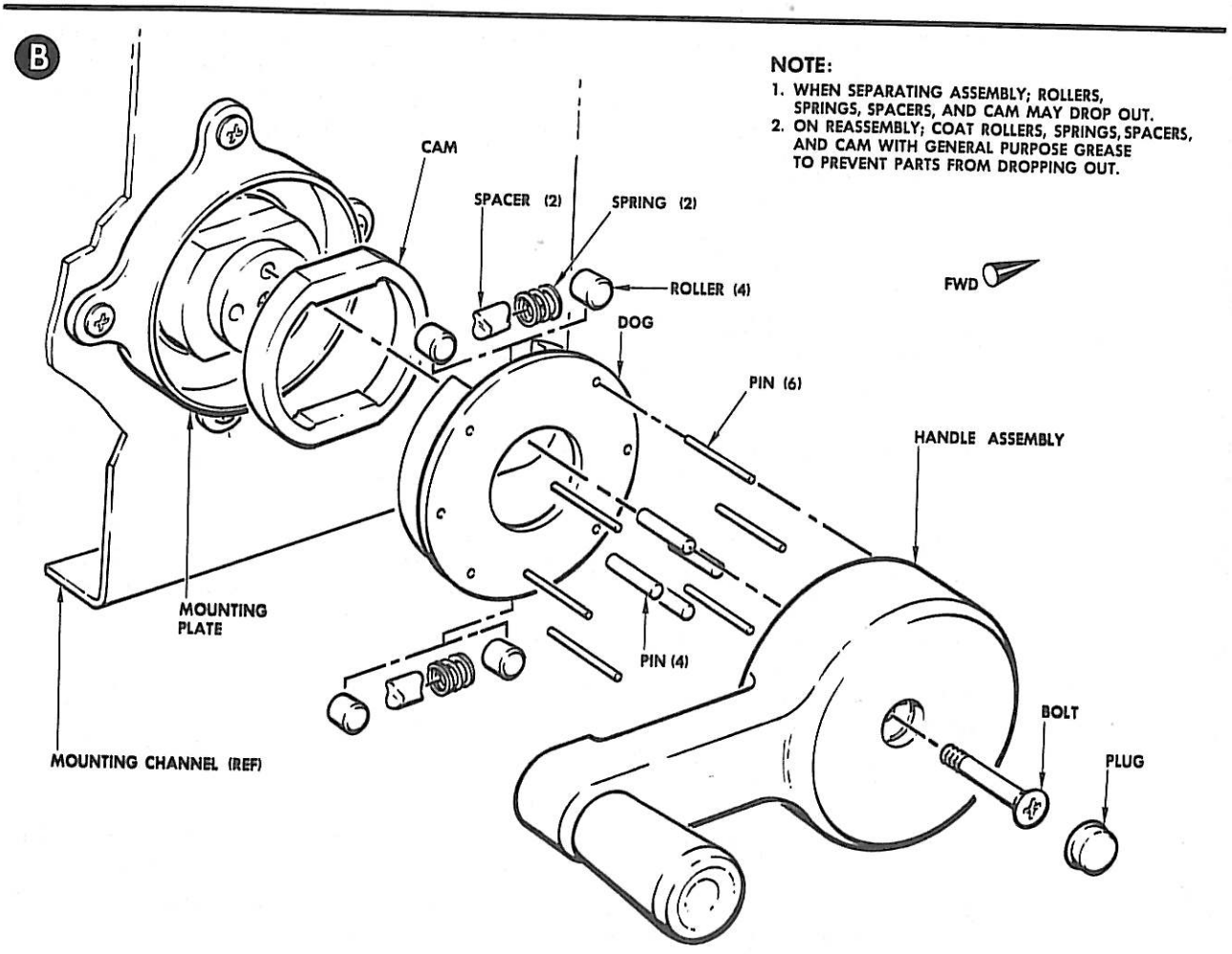
(2) Install sprocket and spacer.

(3) Install (4) bolts attaching handle assembly to channel, as shown in Figure 202.

(4) Adjust cable as directed in Adjustment/Test Sliding Windows.

(5) Safety wire turnbuckle.


A
FWD
B
LEFT HAND SHOWN
(INTERIOR TRIM REMOVED)


B
NOTE:
1. WHEN SEPARATING ASSEMBLY; ROLLERS, SPRINGS, SPACERS, AND CAM MAY DROP OUT.
2. ON REASSEMBLY; COAT ROLLERS, SPRINGS, SPACERS, AND CAM WITH GENERAL PURPOSE GREASE TO PREVENT PARTS FROM DROPPING OUT.
CAM
SPACER (2)
SPRING (2)
ROLLER (4)
FWD
DOG
PIN (6)
HANDLE ASSEMBLY
MOUNTING PLATE
PIN (4)
BOLT
PLUG
MOUNTING CHANNEL (REF)

30.03.56.009

3. Adjustment/Test Sliding Windows (see Figure 201)

NOTE: The adjustment/test procedures for left and right sliding windows are identical.

A. Equipment Required. Calibrated cable tensiometer capable of measuring tension loads of 50 pounds.

B. Adjustment/Test Procedure Sliding Windows.

(1) Adjust sliding window cam linkage located on upper and lower surface of the window assembly. Position window flush with fuselage contour with the window closed. Adjust window cam linkage as follows:

(a) Adjust sliding window cam linkage until window closing operation becomes difficult.

NOTE: The sliding window cam linkage is serrated for adjustment. To adjust cam linkage, loosen attach bolts and reposition cam linkage as required. Lengthening or shortening of the sliding window cam linkage will increase or decrease window pressure (when the window is closed) against the supporting structure. Vertical adjustment of the sliding window is acquired through the installation of washers between the cam link and carriage assemblies.

(b) Loosen cam linkage attach bolts and shorten cam linkage (approximately one or two serrations) until ease of closing is acquired.

(c) To check for proper seal pressure with window in closed position, insert strips of bond paper approximately 1.5 inches wide between the seal and window frame faying surfaces at each corner and at the center of the four sides. When window is closed and locked, the adjustment should be such that the strips of paper are securely clamped but can be withdrawn with a slow steady pull without tearing.

(2) Adjust sliding window adjustment plate, located on lower forward corner of window assembly, to acquire proper window fair-in with fuselage contour. Make certain that the edge of the glass pane does not interfere (ride) on edge of fuselage structure.

(3) Crank window to closed and locked position; check to see that window moves outboard and is pressure-tight at all points, and that the links are locked in overcenter position. The final quarter-turn of crank requires a firm upward pull to lock window, with the crank handle pointing aft.

(4) If required, break safety wire on turnbuckles on the chain and cable assembly and adjust cable tension to 50 lbs., safety wire turnbuckles.

AFT SIDE WINDOWS - MAINTENANCE PRACTICES

1. Removal/Installation Aft Side Windows (see Figure 201)

NOTE: Removal/Installation procedures for left and right aft side windows are identical.

A. Equipment Required.

(1) EC1667 Sealant with EC1662 Primer (or General Electric RTV-90 Sealer with 81822 Primer) as required. 3M Co., St. Paul, Minn.

(2) EC833 Sealant (or equivalent); as required. 3M Co., St. Paul, Minn.

B. Preparation.

(1) Open the AFT-PILOT & COPILOT WINDOWS DEFOG circuit breaker at the main circuit breaker panel. Tag and safety the circuit breaker in the open position.

(2) Remove the following limiter (two places) from ac power distribution box:

AFT-WINDOW ANTI-FOG

WARNING: DO NOT OPEN THE AC POWER DISTRIBUTION PANEL WHEN THE BATTERY POWER IS ON, WHEN THE ENGINES ARE RUNNING, OR WHEN EXTERNAL POWER IS CONNECTED TO THE AIRPLANE.

C. Remove Aft Side Window.

NOTE: Bag and tag loose hardware to facilitate installation.

(1) Disconnect electrical terminals from window. (Tape and tag electrical wiring for installation.)

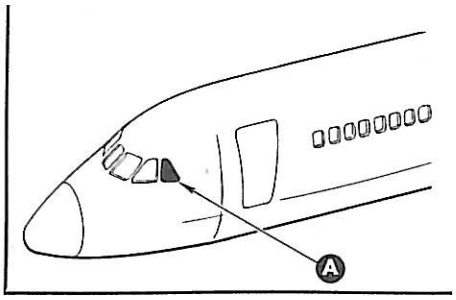
(2) Remove the attaching bolts and nuts from the periphery of the window. Remove window.

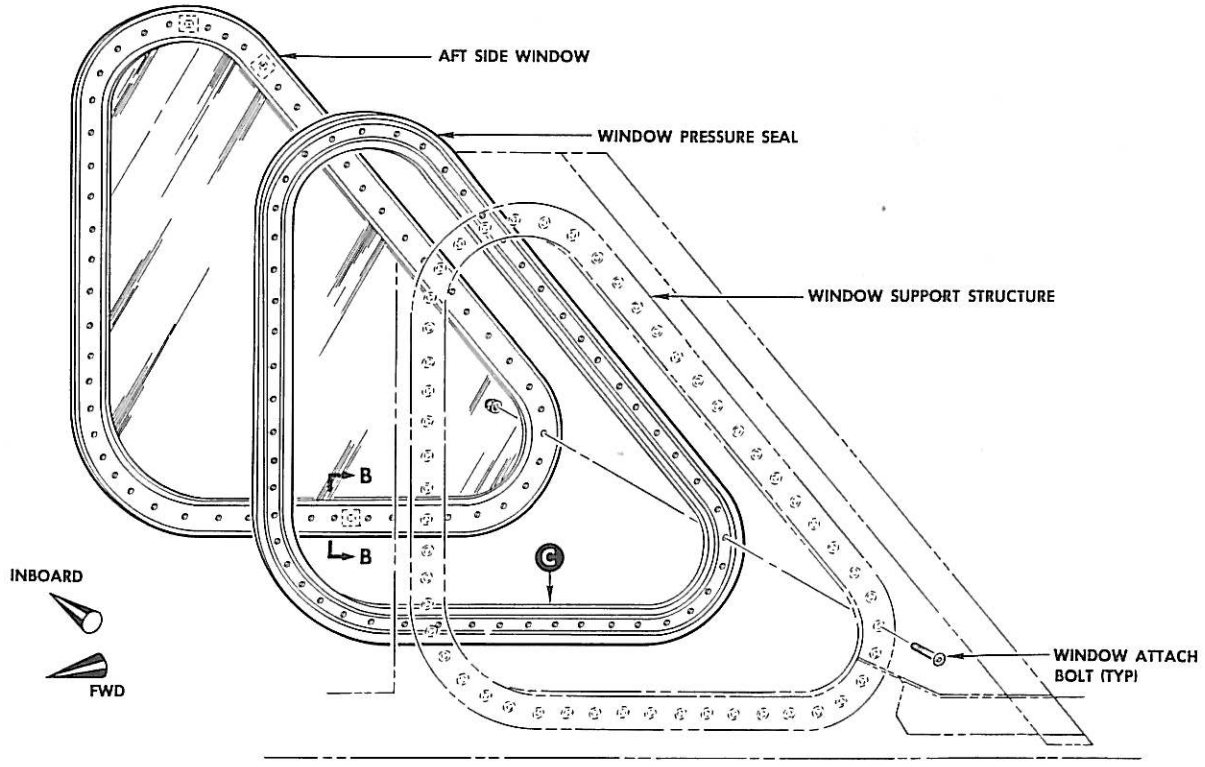
(3) Remove pressure seal from periphery of window opening.

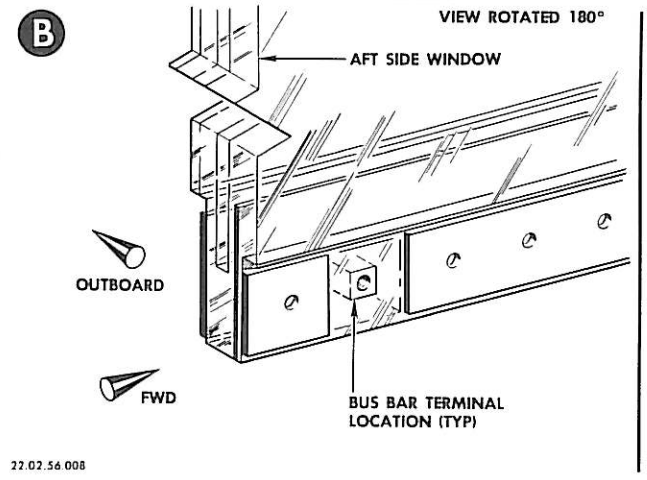
D. Install Aft Side Window.

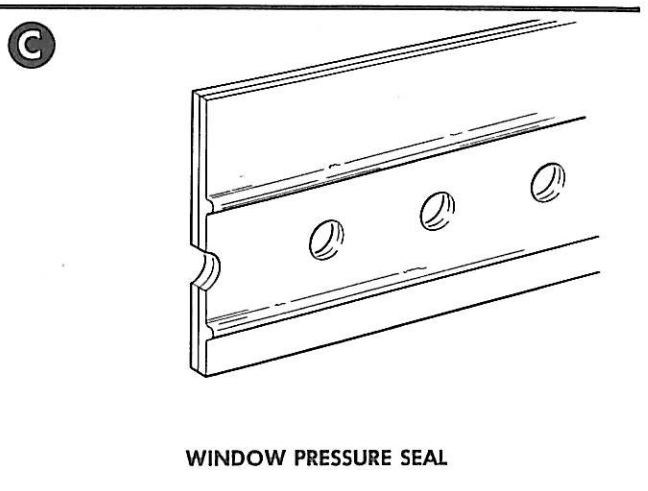
(1) Using a nonmetallic scraper, remove the old Sealant from periphery of the window opening.

(2) Install pressure seal around periphery of aft side window frame. Align bolt holes in pressure seal with bolt holes in window frame.


A


AFT SIDE WINDOW
WINDOW PRESSURE SEAL
WINDOW SUPPORT STRUCTURE
B
B
C
INBOARD
FWD
WINDOW ATTACH BOLT (TYP)


B
VIEW ROTATED 180°
AFT SIDE WINDOW
OUTBOARD
FWD
BUS BAR TERMINAL LOCATION (TYP)
22.02.56.008


C
WINDOW PRESSURE SEAL

NOTE: If not damaged, adhesive-backed pressure seal may be reused during aft side window replacement. Prior to installing reusable pressure seal, apply EC833 sealant to the faying surface of the seal.

(3) Position window over opening. Connect electrical terminals to window.

(4) Using bolts and nuts, install the window.

NOTE: Apply EC1667 Sealant to threaded portion of bolts prior to installation. Torque bolts 12-15 inch-pounds.

(5) Using EC1667 Sealant (preceded with EC1662 Primer), fill gap between aft side window frame and adjacent structure. Apply sealant flush with outside surface of window frame and adjacent structure.

(6) Perform a functional test of the flight compartment window heating system in accordance with Chapter 30, ICE AND RAIN PROTECTION.

(7) Clean window in accordance with 56-1-0.

CABIN WINDOWS - DESCRIPTION AND OPERATION

1. General

Windows, uniform in size and construction, are installed along the sides of the fuselage in the cabin area. These windows are rectangular in shape and approximately 11 x 15 inches in size; they are spaced approximately 19 inches apart from center to center. No stringers or longerons are employed in the cabin window area, nor are the window frames attached to the fuselage beltframes. The skin cutouts which accommodate the windows and mounting frames are approximately 12 inches wide and 16 inches high. (See Figure 1.)

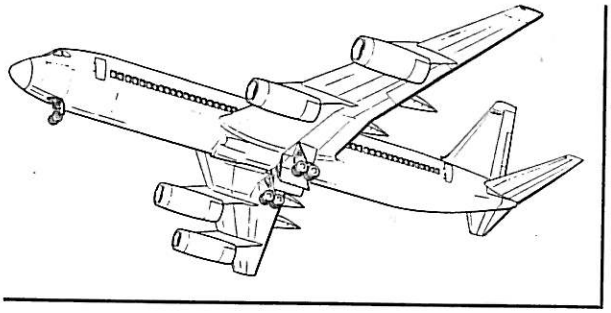
Each cabin window contains an inner and outer Plexiglas panel. The outer panel consists of two sheets of stretched Plexiglas 55. The Plexiglas sheets are bonded and sealed together around the edge to form a single unit. A bonded filler is installed around the edge of the panel between the two Plexiglas sheets. The filler maintains a 1/8-inch air space between the Plexiglas sheets. The inner panel of the cabin window consists of a single sheet of Plexiglas mounted in rubber.

2. Construction

The window outer frame is forged and machined from 2014 aluminum alloy; it is riveted to the interior surface of the heavy gage fuselage skin at the window cutouts. The window's inner support frame is made of fiberglas and attaches to the outer frame with rivets. The inboard edge of the window inner frame supports the inner window.

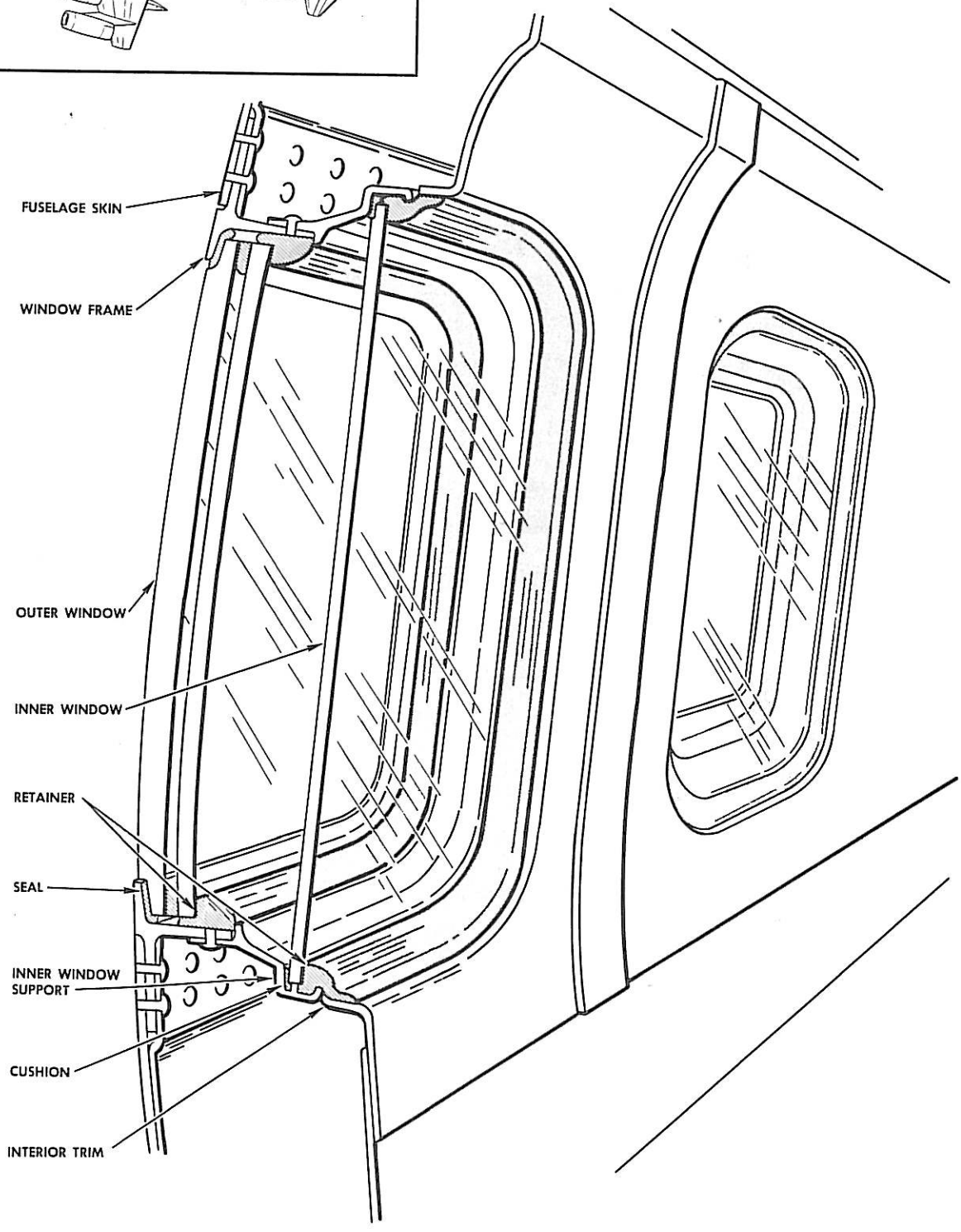
An adhesive-backed silicone rubber seal is employed between the outer window and the forged window outer frame. A similar seal is installed between the inner window panel and the inner support frame.

The inner and outer window panels are held in position by rubber retainers. The retainer holding the inner window panel fairs into the surrounding interior cabin trim.



NOTE

1. THE OUTER WINDOW IS TWO PANES OF STRETCHED PLEXIGLAS 55, SEPARATED BUT FORMED INTO A SINGLE UNIT.
2. WINDOW INSTALLATION SHOWN IS TYPICAL THROUGHOUT THE CABIN AREA.



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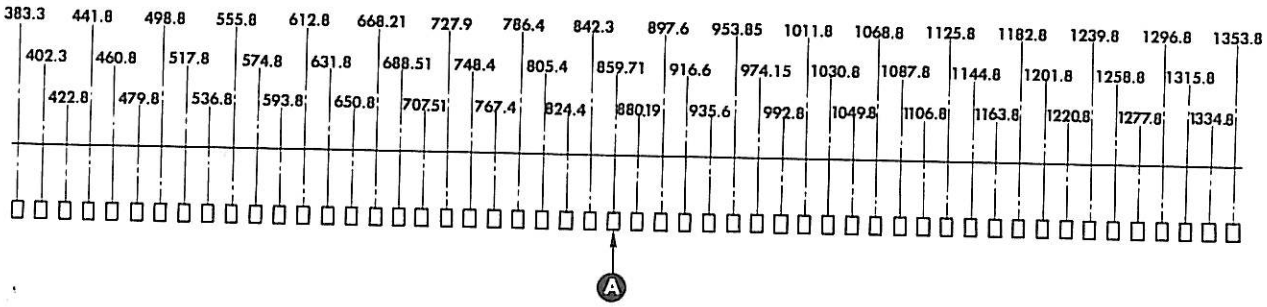
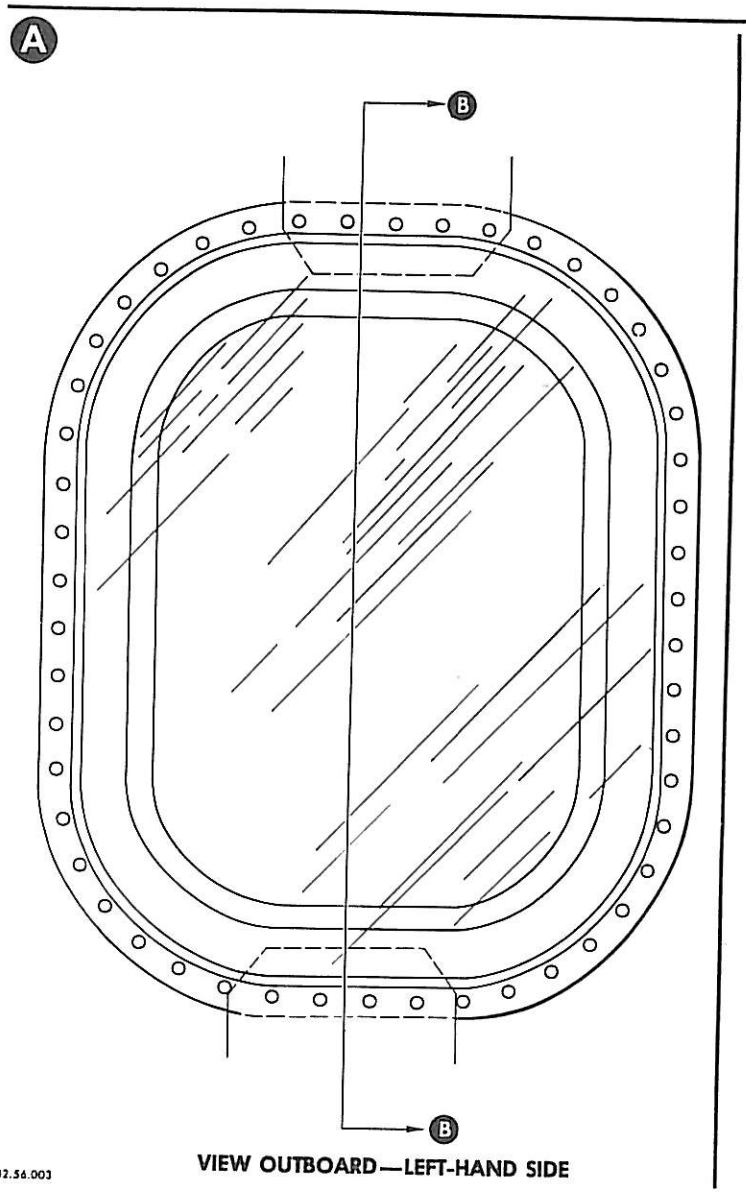
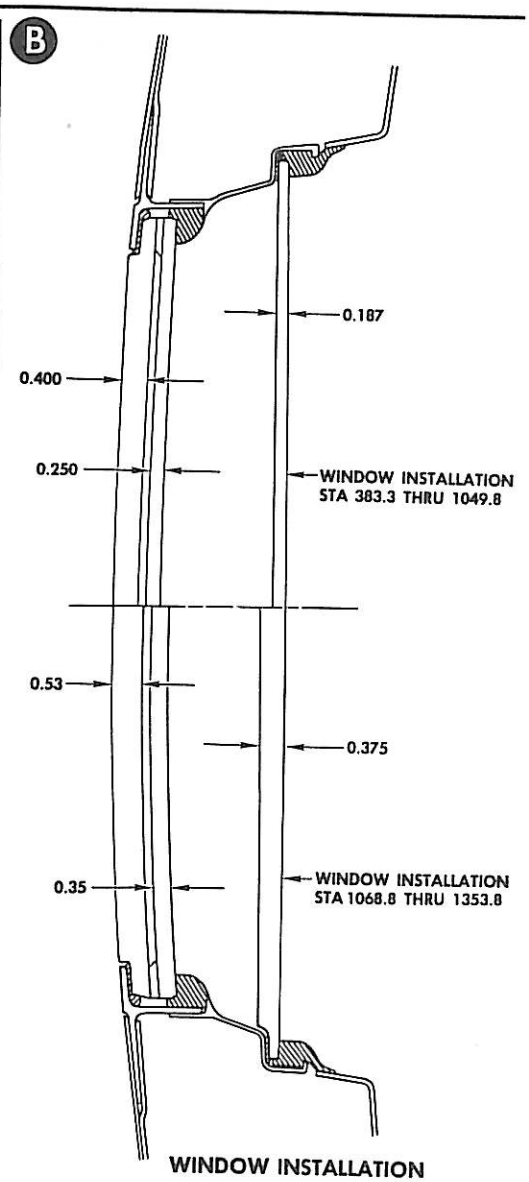
Cabin Windows - Typical
Figure 1 (Sheet 1 of 2)





30.02.56.003

VIEW OUTBOARD—LEFT-HAND SIDE



WINDOW INSTALLATION

CABIN WINDOWS - MAINTENANCE PRACTICES

1. Removal/Installation Cabin Windows (see Figure 201)

A. Equipment Required. EC833 Sealant (or equivalent); as required. 3M Co., St. Paul, Minn.

B. Removal.

NOTE: Bag and tag loose hardware to facilitate installation.

(1) Working from inside the fuselage cabin, remove rubber retainer from around inner edge of inboard window panel.

(2) Remove inboard window panel.

(3) Remove adhesive-backed seal from periphery of inboard window support frame.

NOTE: If not damaged, seal may be re-used during cabin window replacement.

(4) Remove rubber retainer from around inner edge of outboard window panel.

(5) Remove outboard window panel.

(6) Remove adhesive backed seal from periphery of outboard window frame.

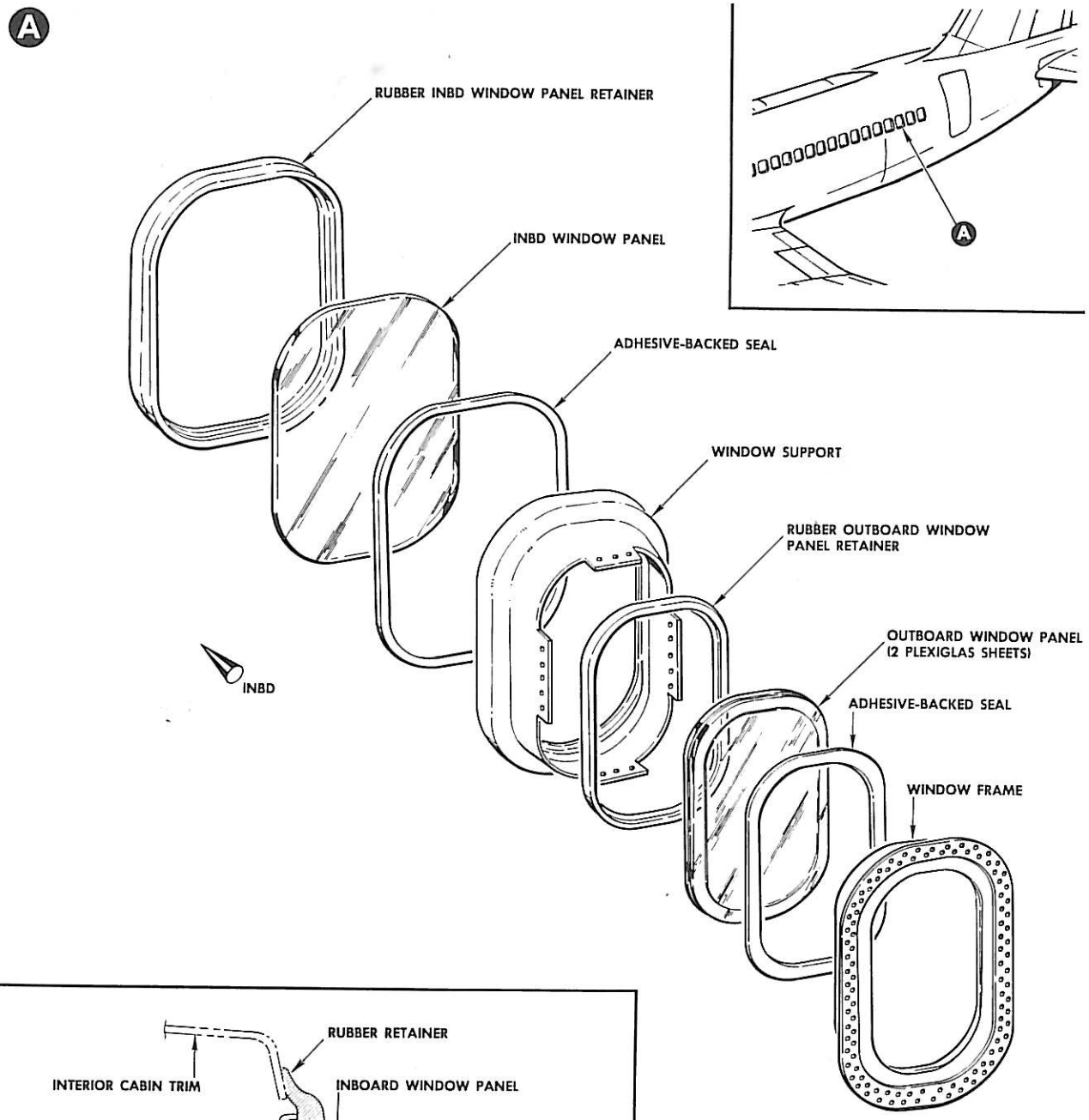
NOTE: If not damaged, seal may be re-used during cabin window replacement.

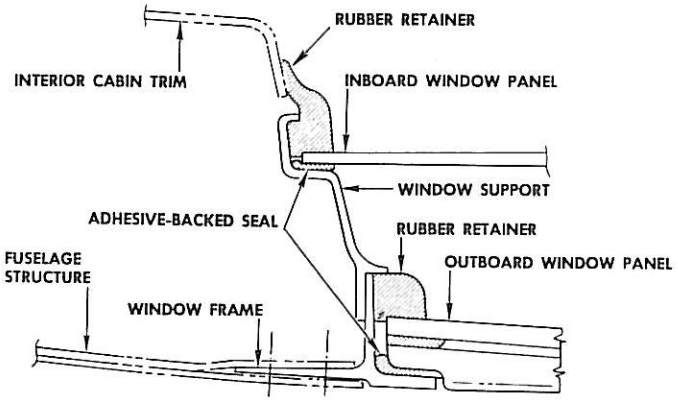
C. Installation.

NOTE: Prior to installation, remove protective covering, installed on surface of window, from the edge of the window panel until approximately 3/4 inch of the transparent plastic is exposed around the edge of both sides of the window. Do not allow any hard, sharp or abrasive object to contact the window surface.

(1) Apply adhesive-backed rubber seal to inner side of outboard window frame.

NOTE: Assure that window frame is thoroughly cleaned prior to installation of seal. Avoid touching adhesive side of seal after removal of backing material. If not damaged, seal may be re-used during cabin window replacement. Prior to installing reusable pressure seal, apply EC833 sealant (or equivalent) to the outboard faying surface of the seal.





TYPICAL CROSS SECTION CABIN WINDOW INSTALLATION

22.02.56.009A

(2) Position outboard window panel against rubber seal.

(3) Install rubber retainer around inner edge of outboard window panel.

(4) Apply adhesive-backed seal around periphery of inboard window support frame.

NOTE: Clean inboard window support frame thoroughly prior to installation of seal. Avoid touching adhesive side of seal after removal of backing material. If not damaged, seal may be re-used during cabin window replacement. Prior to installing reusable pressure seal, apply EC833 sealant (or equivalent) to the outboard faying surface of the seal.

(5) Position inboard window panel against seal on window support frame. Install rubber retainer around inner edge of the window panel.

(6) Clean window as directed in Cleaning/Painting Cabin Windows.

2. Inspection/Check Cabin Windows

A. Examine cabin window panels for the following:

(1) Check inboard and outboard surfaces of the double outer window pane for scratches, flaking and chipping.

(2) Check window frames and supporting structure for cracks and corrosion.

(3) Check that rubber window retainers are properly positioned.

(4) Check inboard surface of inner window pane for scratches, flaking, and chipping.

3. Cabin Windows Allowable Damage

Damage beyond allowable limits specified must be corrected by replacement of the cabin window pane or panel.

A. Scratches.

(1) Outer surface of outboard double pane assembly:

Scratch depth of 0.06 inch or enough minor scratches to make passenger vision unsatisfactory.

(2) Inner surface of outboard double pane assembly:

Scratch depth of 0.03 inch or enough minor scratches to make passenger vision unsatisfactory.

(3) Inner or outer surfaces of single inboard pane:

Enough minor scratches to make passenger vision unsatisfactory.

B. Chips and Flakes.

(1) Outer surface of outboard double pane assembly:

(a) At the periphery of edge:

Chip depth or 0.15 inch, chip diameter of 0.50 inch, or distance between chips of less than 1.00 inch.

(b) Viewing area:

Chip depth of 0.06 inch.

(2) Inner surface of outboard double pane assembly:

(a) At the periphery or edge:

Any chip or flake.

(b) Viewing Area:

Chip depth of 0.03 inch.

(3) Inner or outer surfaces of single inboard pane:

Enough chips or flakes to make passenger vision unsatisfactory.

4. Cleaning/Painting Cabin Windows

A. Equipment Required.

(1) Nu-Wipe paper tissue toweling.

(2) Castile soap; as required.

(3) Shell Solvent TS-1; as required.

CAUTION: DO NOT USE SOLVENTS, WHICH CONTAIN AROMATIC HYDROCARBONS, FOR CLEANING PLEXIGLAS WINDOWS. ACRYLIC PLASTIC ABSORBS SOLVENT FUMES. THESE FUMES COULD DESTROY THE WINDOW'S STRUCTURAL STRENGTH AND OPTICAL QUALITY.

B. Clean Window.

(1) Flush exterior surface of window with generous amount of clean water, using bare hand to gently dislodge softened particles of foreign matter.

CAUTION: REMOVE RINGS OR OTHER HARD OBJECTS FROM HANDS BEFORE WASHING WINDOWS.

(2) Using care to avoid damage to window, wash the window with soap and water only. The water must be free of any abrasive matter. Rub gently with bare hands only; a clean sponge may be used to apply the soap and water to the plastic window, but must not be used for scrubbing or washing. If soap and water will not clean the window, clean as directed in step (5).

(3) Rinse window thoroughly with clean water.

(4) Blot (DO NOT RUB) the window dry, using Nu-Wipe paper tissue.

(5) Remove oil and grease residues by applying Castile soap (10% solution) or Shell Solvent TS-1 with bare hands.

(6) If after removing dirt and grease, the window surface is marred by light scratches, polish as follows:

(a) Wrap rubber block with sandpaper No. 600A.

(b) Rub the scratched area with the sandpaper, using a circular motion approximately six inches in diameter. Use water, or a two percent soap solution as a lubricant.

(c) Rinse window thoroughly with clean water. Dry with a clean flannel cloth dampened with water and thoroughly wrung out.

(d) Remove any remaining fine scratches by applying small amount of cleaning and polishing compound with a damp flannel cloth wrapped around the rubber block.

(7) Dust the interior surface of the window with a clean section of flannel that has been saturated with clean water.

(8) Wipe surface carefully with a clean damp section of flannel, or with a sponge. Keep the flannel or sponge free from dirt or grit by rinsing frequently in clean water.

(9) If oil or grease is present on surface of window, remove as outlined in step (5).